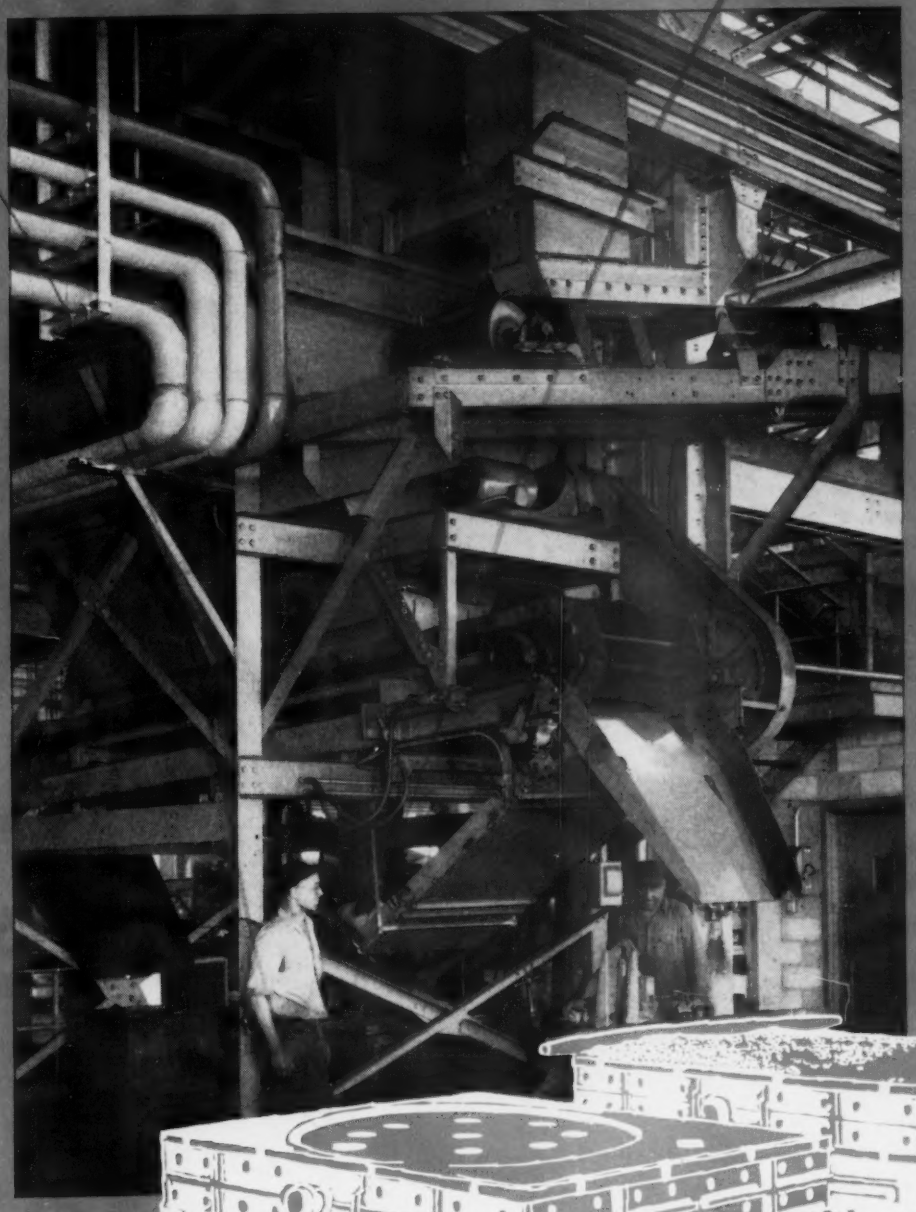
FOUNDRY

OCTOBER
1956

A PENTON PUBLICATION



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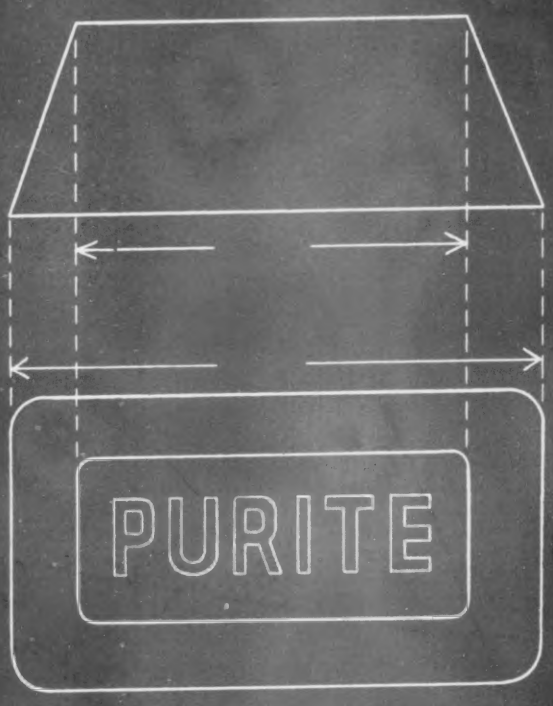

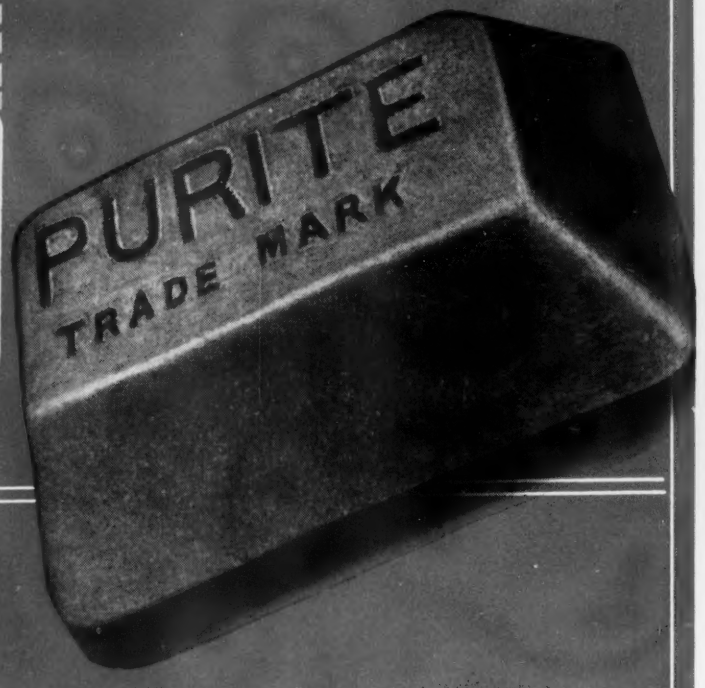

blueprint for
100% FLUXING
AND DESULPHURIZING ACTION

PURITE produces higher percentages of acceptable finished castings—fewer rejects per ton of metal poured.

PURITE is time-tested and proved for rapid and unsurpassed desulphurizing uniformity.

PURITE permits the use of higher sulphur raw materials.

PURITE is 100% pure fused soda ash—you do not pay for inert materials.

PURITE comes in uniform 2-lb. pigs—no weighing or measuring required.

PURITE does not crumble—is easy to handle—no waste, no dust.

PURITE can be shipped in bulk carloads at substantial savings over bag shipments—is easily stored without deterioration.

PURITE is the scientific flux for better melting and cleaner iron.

Sold by leading foundry supply houses in the United States and Canada.

MATHIESON

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OLIN MATHIESON CHEMICAL CORPORATION
INDUSTRIAL CHEMICALS DIVISION · BALTIMORE 3, MD.

3503

Circle 551 on Inquiry Card—Page 219

Teeth that hold like a bear-cat

...or how Chuck Wright raised stamina in large gears

"First, a large grinding mill gear brought a complaint from the customer. The next week another large gear, one cast to drive a pebble mill, caused a beef. Soon after, another customer complained about a big blower gear that galled. Naturally, Knox Foundry recognized a problem, and wired for help," explained Chuck.

"All three castings lacked wear resistance. On blower and pebble mill gears, teeth broke in service.

"These failures stymied Angus Bryden and the boys at Knox. They'd been pouring gears for a long time . . . not as large . . . but results were tops with a NCI 40 alloy iron.

"Moulding, sand, risering . . . the Knox practice was OK . . . and in view of their prior success with iron of about 3.30 carbon, 2.00 silicon plus a little alloy, they couldn't see why these castings failed.

"In large gears, the teeth are critical sections. But, as I explained to Angus, the thickness of the rim is the section determining the properties. For rims 4" thick in which teeth are cut, I suggested an addition of 2½ to 3% nickel plus .5 to .6% moly, with carbon adjusted down to 3.00% and silicon down to about 1.75% to compensate for the heavier rim sections. Also showed how structure control improves wear properties.

"This composition would give a minimum tensile of 50,000 in a 2" bar . . . and also higher machinable hardness, greater wear resistance and impact strength.

"I showed Angus this bar chart of galling resistance, so he'd aim for the right structure. And a good aim he had!

"Today, the Knox crowd is very happy with the results they get.

"When it's a battle to furnish what the customer wants, don't lose out on a metallurgical TKO. Call me in. Maybe I can help. Easiest way to reach me is through INCO."

Galling Resistance
(From compressive stress-load curves)

Specimen Load (lbs.)	100	200	300	400
Gray Iron				
(dendritic structure)	■	■		
(some ferrite)	■	■	■	
(controlled structure)	■	■	■	■

Chuck Wright

*Trademark of The International Nickel Company, Inc.

INCO TRADE MARK

The International Nickel Company, Inc.
67 Wall Street New York 5, N. Y.

FEDERAL GREEN BOND BENTONITE

"the best of the bentonites"

and here's why . . .

LOW VISCOSITY★
(a "natural" characteristic—not "added")
LONGER-LASTING GREEN STRENGTH
LONGER-LASTING DRY STRENGTH
pH RATING OF 9.0
AVAILABLE IN PULVERIZED, GRANULAR AND SLURRY GRADES

EIGHTEEN CONVENIENT SOURCES for IMMEDIATE DELIVERY

★ Federal warehouse
• Stocked by dealer

★ Federal GREEN BOND'S low viscosity enables users to temper sand with less water, get optimum strength with less mulling time, when "dry ad-mixed" to sand. When used as a "slurry", up to 25% more GREEN BOND may be added to the water, to produce a more potent slurry and provide easier control of moisture and sand strength.

Write for your copy of "Tailor-Made Molding Sands".

THE FEDERAL FOUNDRY SUPPLY CO.
4600 EAST 71ST STREET · CLEVELAND 5, OHIO

FOUNDRY
A PENTON PUBLICATION

October 1956
Volume 84—Number 10

Editorial 103

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(For addresses of branch offices, see page 299)

THE COVER: Molding operation at new gray iron foundry of the Bullard Co., Bridgeport, Conn. Photo by courtesy of the C. O. Bartlett & Snow Co., Cleveland

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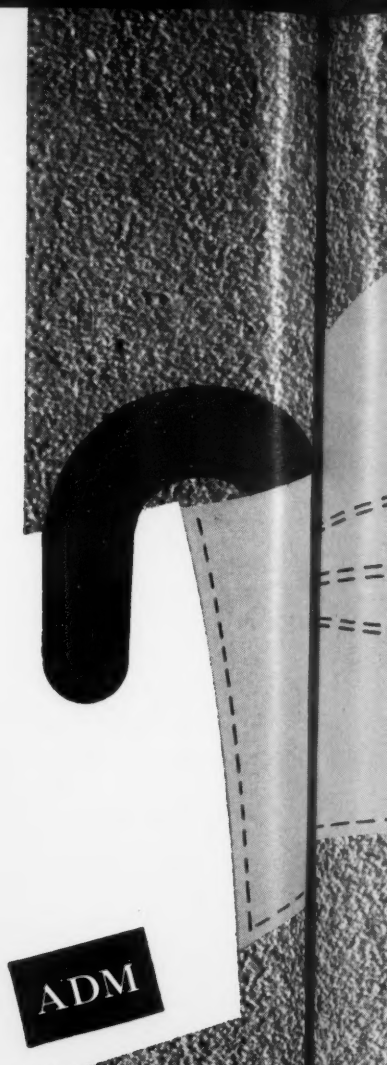
ADM presents with pride the

V.I.P.*

of core binders...



HOW DOES *LinOSet* SPEED PRODUCTION?

1. Reduces man hours by 50% or more fabricating large cores.
2. Fewer rods are needed for reinforcement because LIN-O-SET cores are stronger before and after baking.
3. Average baking time is reduced by 30%.
4. Collapsible LIN-O-SET cores shake out like sugar . . . drastically reduce cleaning time.

HOW DOES *LinOSet* IMPROVE CASTING QUALITY?

1. LIN-O-SET cores resist deformation during baking; maintain excellent dimensional stability; set up on contact with core box.
2. Sand systems are uncontaminated by LIN-O-SET.
3. LIN-O-SET cores improve casting finish.

ANY OTHER *LinOSet* ADVANTAGES?

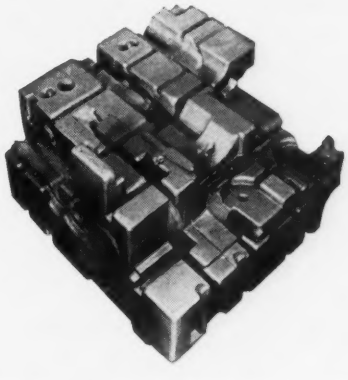
1. LIN-O-SET lets you accurately control set-up time regardless of operational or climatic conditions.
2. LIN-O-SET is immediately adaptable to practically all sand mixing procedures. No special measuring or mixing equipment needed.
3. LIN-O-SET cores do not produce toxic fumes or objectionable odors.
4. Normal wash procedures may be employed without damage to cores.
5. LIN-O-SET and LIN-O-SET bonded cores offer indefinite storage life.

Lin-O-Set

✱ V.I.P. means very important product—very important to foundrymen looking for ways to cut costs. More than just another binder, LIN-O-SET is a *New Method* of core making designed especially for medium-to-heavy work and especially suited to jobbing foundries. A specialized quick curing core binder that "sets up" at room temperature, the purpose of LIN-O-SET is to speed production and improve casting quality.

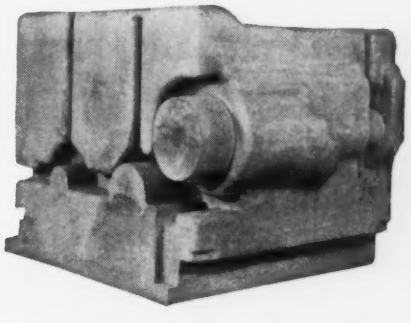
SOME FOUNDRIES SAY: "It's expensive *Not* to use new LIN-O-SET." For instance, these examples of heavy, intricate cores are produced in a comparatively short time and with no complications . . .

AT ST. MARYS FOUNDRY CO., *St. Marys, Ohio:*



Intricate St. Marys core made with LIN-O-SET was used to produce a horizontal boring mill head weighing 2946 lbs. and measuring 31½" x 36" x 44". Ramming and finishing this core was regularly a 5¾ hour job. With LIN-O-SET it now takes only 1¼ hours . . . over 3 times as fast.

AT STATE FOUNDRY CO., *Akron, Ohio:*



New LIN-O-SET core mix enabled State Foundry to fabricate this 1740 lb. core in 1¾ hours, a job which previously took 8 hours using conventional binder. This core, measuring 31" x 39" x 27", is used in producing a 62" vertical boring mill base.

These cores may be seen at the 1956 AFS Castings Congress, Atlantic City—Booth 1636-38

rcher · aniels · idland company

FOUNDRY PRODUCTS DIVISION • 2191 WEST 110th ST., CLEVELAND 2, OHIO

LINOIL **INDUCTOL** **LIN-O-CEL** **FRE-FLO** **ADMIREZ** *Lin-O-Set*

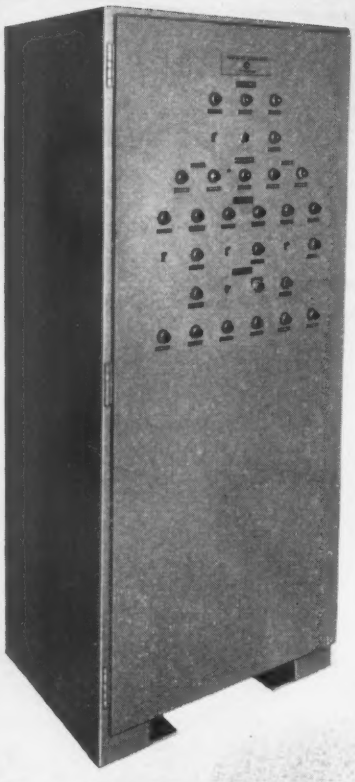
Circle 555 on Inquiry Card—Page 219

NEW!

NEW!

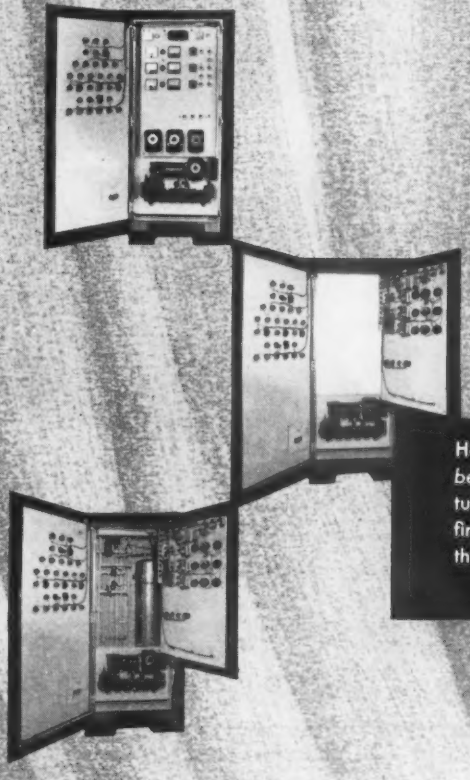
NEW!

NEW!



the HARTLEY SAND CONTROLLER

SERIES XI



brings the modern foundry these advantages—

- **Automatically and accurately controls sand moisture**
- **Increases sand production**
- **Improves casting finish**
- **Reduces scrap**

Here's the revolutionary method of controlling sand moisture *while the sand is being mixed!* Sensing probe installed in the mixer determines existing temperature and moisture as sand is blended. Water is added in three stages to bring final moisture content to the exact *level* desired. This is all accomplished during the normal mulling cycle . . . *there is no increase in mulling time!*

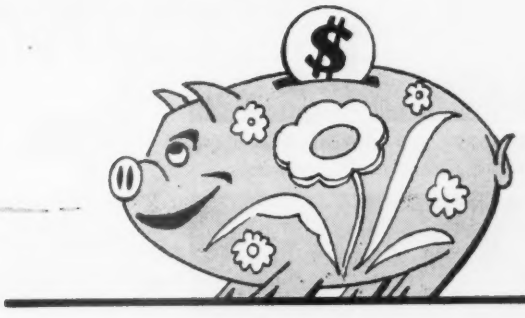
Complete information sent upon request

HARTLEY *Controls* CORPORATION

NEENAH, WISCONSIN

DEPENDABLE QUALITY...

SAVINGS TOO!



Users of Metal Blast's SUPER-ANNEALSHOT live "high off the hog"! For Metal Blast guarantees the most dependable quality of any abrasive on the market. Yet, because it takes advantage of all the economies of mass production, Metal Blast prices are right in line and, in some cases, lower! So, to begin with, you pay no more, but still get the savings inherent with top quality. We'd sure appreciate a trial!

METAL BLAST, INC.

872 EAST 67th STREET • CLEVELAND 3, OHIO

PRODUCING THE FINEST CHILLED AND MALLEABLE SHOT AND GRIT ON THE MARKET

Circle 557 on Inquiry Card—Page 219

For the newest in coated abrasives . . . watch BEHR-MANNING!

METALITE . . . A natural for polishing intricately shaped casting surfaces.

METALITE . . . Favored for bringing-up superior finishes in fast time.

METALITE . . . Tops for removing flash from difficult inside contours.

Polishing a parting line on a non-ferrous casting

With Behr-Manning Abrasive Belts on hand, the job is both easy and highly productive. Foundries all over the country are finding these fast-cutting, long-lasting belts the answer to increased output with far better finishes.

Try a Behr-Manning Coated Abrasive Belt on your next grinding, polishing or finishing operation. A Behr-Manning Field Engineer will gladly demonstrate in your foundry or at a nearby Behr-Manning Demonstration Room. Call him today, or write Behr-Manning Co., Troy, N. Y., Dept. F-10.

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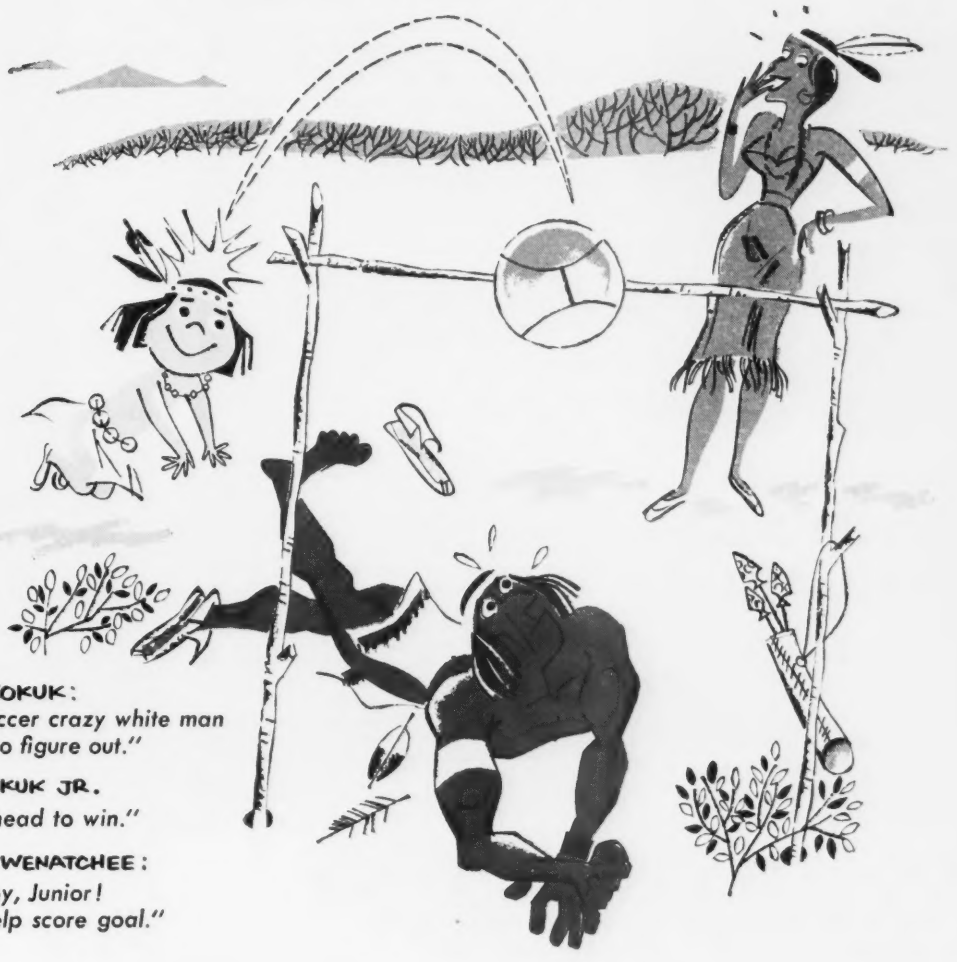
"HEADWORK" SCORES GOAL FOR JUNIOR

(or how control helps win the game!)



CHIEF KEOKUK:
"Ugh! Soccer crazy white man game — no figure out."

CHIEF KEOKUK JR.
"Me use head to win."

PRINCESS WENATCHEE:
"Smart boy, Junior! Control help score goal."

In soccer, football, baseball or any sport it pays to use control. It pays also in processing iron and steel. Many foundries and steel plants are controlling costs and quality with Keokuk Silvery Pig Iron . . . the superior form of silicon introduction. Pig for pig, car for car, its uniformity never varies. Handle it by magnet . . . charge it by weight (or count the piglets for equal accuracy). Leading aluminum producers specify Keokuk Silicon Metal for uniform high purity. When you think of silicon, think of Keokuk!

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Wenatchee Division, Wenatchee, Washington

SALES AGENT: MILLER AND COMPANY

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3504 Carew Tower, Cincinnati 2, Ohio
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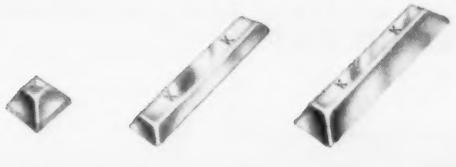
Keokuk Silvery Pig Iron is available in 60 and 30 pound pigs and 12½ pound piglets . . . in regular analysis or alloyed with other elements to match your requirements.



Circle 559 on Inquiry Card—Page 219

1500-lb. SHOCK LOADS HIT THIS IMPERIAL BELT

Every 5 minutes, a 1500-lb. load of hot carbon pitch mix is dumped on this Imperial Standard Sahara Impregnation 935 Innerlocked Conveyor Belt. Temperatures of the mix are 285° to 300° F.

Since 1948 this belt (102′ long x 30″ wide x 6 ply) has been in operation 9 hours a day, 5 days a week in the Speer Carbon Co., St. Marys, Pa., plant. In addition to heat and impact, it has also withstood the damaging effects of hydrocarbons in the mix, giving excellent service throughout its long life.

Job-Designed Belting

Imperial Belts will last longer in your service because:

1. INNERLOCKED* construction, an exclusive Imperial process, permanently locks together the heavy-duty hard silver duck plies.
2. Special Imperial impregnating compounds make each brand of belting perform best under specific operating conditions.

Imperial Belts are job-designed to give you lowest ultimate belt cost and highest day-to-day operating satisfaction. Write for Data Sheet 54-2 which describes Imperial Sahara Belts for foundry service.

*INNERLOCKED—*Reg. trade mark of Imperial Belting Co.*

You expect more from Imperial . . . and you get more!

Imperial BELTING CO.

1755 S. Kilbourn Ave., Chicago 23, Ill.

Circle 560 on Inquiry Card—Page 219

With the Editors

VOICES OF INDUSTRY: Because the editors of FOUNDRY believe thoroughly in the importance of business publications in the progress and growth of industry, we were especially appreciative of the following comment which appeared in a recent issue of "Link-Belt News" under the heading of "Know-How Magazines the Voices of Industry":

Many reasons have been given for the success of America's free enterprise system. There are truly many reasons. One of the most important is the constant infusion of the "circulating know-how" which our system receives from our business publications.

By the uniform excellence of their performance, these vital and widely circulated publications, with the readership of approximately 30 million, have raised themselves and their influence to the point where they have become an indispensable arm of business and industry.

It is safe to say that everyone engaged in any responsible post, and everyone who strives to achieve responsibility, regards his particular business publications as must reading. No one who wants to keep abreast of his own field of interest can afford not to take the time to read them. Our constantly changing and growing economy moves so rapidly we must read our business publications if we hope to keep our own knowledge in step with current developments.

From the appearance of the first business paper near the end of the 18th Century, the development of the "know-how" magazines has followed steadily the economic development of the nation itself. The publications not only mirrored our total development, but their circulation of our American savvy pushed us all along.

Today more than 2000 business publications with some 10,000 editorial workers are keeping American savvy flowing into the veins of our economic life. If we take the time to read the publications that deal with our specific fields, we will have the advantage of a never-ceasing postgraduate course in our own particular specialty.

More power to these voices of industry.

—o—

Hall Book: "Steel Foundry Facts" of the Steel Founders' Society of America has the following to say about *Steel Foundry Practice,* by John Howe Hall, which recently was published by the Penton Publishing Co.:

This volume brings together in one collection the late John Howe Hall's FOUNDRY articles on steel foundry practice. They were written by Mr. Hall as a comprehensive, detailed discussion of such practices which would comprise an integrated book upon their completion. The last chapter was finished just before his death in 1953.

The contents include chapters on core and molding sands; patterns and molding methods; gates and heads; machine molding; flasks and rigging; centrifugal casting; shakeout, cleaning and welding; heat treatment; cast-weld construction; open-hearth steelmaking; electric melting furnaces; the converter process; and pouring practice. More than 240 illustrations supplement the text.

Mr. Hall thoroughly discusses the various molding machine methods available. Another outstanding chapter is one devoted to flasks and rigging; here Mr. Hall details such things as the lifting force exerted on a core extending into the mold cavity. Centrifugal casting chapter reviews the three basic methods with calculations regarding mold speeds.

To these subjects, Mr. Hall brought a wealth of knowledge and experience. He was associated with the steel castings industry for nearly 50 years. During that period he became one of the leading authorities in the field.

In addition to his development work, especially in the field of heat-treated manganese steels, he contributed much to the technical literature on steel castings.

—o—

Outstanding Service: When you think about all of the conventions, meetings and plant visits our editors make, you wonder if they ever find time to participate in activities beyond the foundry field. Well, they do, and Bill Gude, our managing editor, is a good example.

Ten years ago, a group of editorial, advertising and public relations experts formed the Minute Man Committee of the Cleveland Community Chest. The purpose was to show the public in various ways what Red Feather contributions accomplish. Among the committee's activities is the preparation and staging of a weekly radio program, "I Found a Story."

Bill has been a member of the committee since its inception. Recently he was presented an attractive paper weight with the following inscription: "Outstanding Service Award Presented William G. Gude, Volunteer Minute Man, 1946-1956, The Community Chest, Cleveland, Ohio."

All of us are proud of Bill and this fine record of service.

The illustration shows Bill (left) and John S. Morgan, associate managing editor of our sister publication *Steel,* holding an Oscar presented to John for five-years' service on the committee.

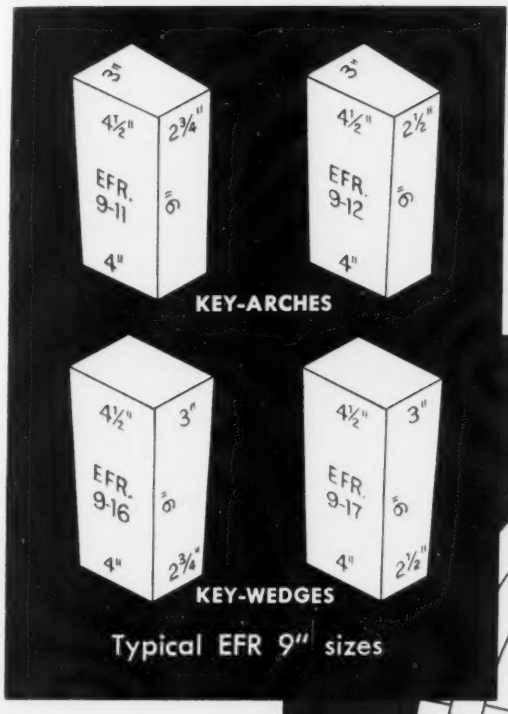
—o—

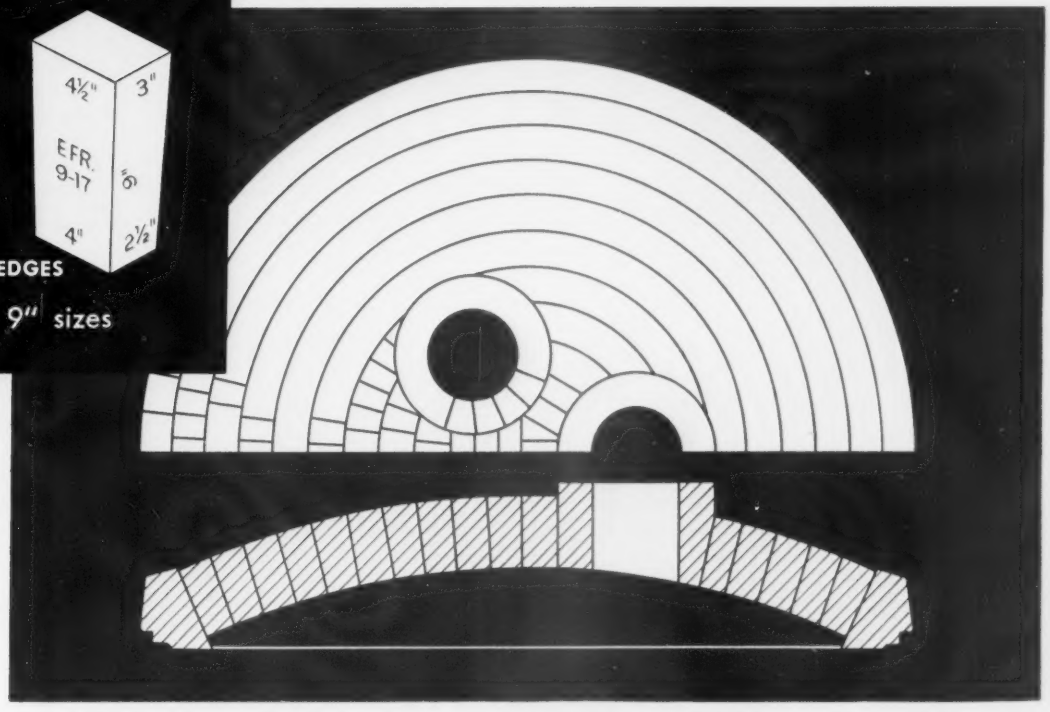
Cast Pipe the Winner: The *Cleveland Plain Dealer* recently carried a story on how the big ore freighter *Philip D. Block,* of the Inland Steel fleet, suffered a jagged cut in sev-

For electric furnace roofs

Harbison-Walker EFR design

provides important benefits





Harbison-Walker EFR (electric furnace roof) brick are modified 9″ key-arches and key-wedges, designed for use in combination with a large proportion of standard 9 x 4½ x 3″ sizes in the construction of roofs of any diameter and rise.

The use of these EFR shapes insures a close fit of the brick and roof construction of best workmanship.

The number of different sizes required for building a roof with the aid of the EFR brick is greatly reduced for some designs.

Bricklaying is simplified and much time is saved when EFR brick are used.

EFR brick are power pressed by which method of forming all of the most desirable physical properties are secured.

Roofs built of smaller brick units in preference to large special shapes generally prove to be more serviceable. The smaller sizes are more resistant to thermal shock.

The EFR shapes cost less than large special shapes and since they are used with standard 9″ sizes in predominance, the overall cost is considerably reduced.

H-W High Alumina Castable and Korundal Ramming Mix sometimes are used to advantage as a monolith to facilitate easy fitting in the center section.

The EFR brick, together with the standard 9″ sizes needed for complete roofs, are furnished in the types and classes of refractories best suited for the various operating conditions. For example, they are made in the following brands: STAR and VEGA silica brick; H-W MULLITE; KORUNDAL; and various Harbison-Walker superduty brands, such as ALAMO and H-W SUPER SAVAGE.

The combination of quality, H-W Technical Service and balanced selection based on availability of all types and classes of refractories from one source, provides maximum economy.

HARBISON-WALKER REFRACTORIES COMPANY
AND SUBSIDIARIES
World's Most Complete Refractories Service
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Circle 561 on Inquiry Card—Page 219

MORE WORK . . . FASTER!
WITH ERIE STRAYER HOOK-ON CLAMSHELLS

CHECK these exclusive features:

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- √ COMPACT, RUGGED DESIGN—longer, tougher service.
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- √ ¼ TO 10 YARD CAPACITY—models to suit your needs.

THE FAMOUS **STRAYER ELECTRIC** BUCKET
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ERIE STRAYER CO.
GEIST ROAD • ERIE, PENNSYLVANIA

Circle 562 on Inquiry Card—Page 219

eral of her starboard bow plates just above the water line. The ship was turning around in the Black River at Lorain, O., and smashed into a "huge cast iron sewer outlet pipe which protruded from the bank."

Don Workman, executive vice president of the Gray Iron Founders' Society, made quite sure that I saw this story of an iron casting winning the tussle with rolled steel.

—o—

Hot but Clean: The following story, with a number of illustrations, appeared in the Aug. 10 issue of the Cleveland Press. I leave it to you as to the progress we have made in general industry publicity since the hectic days of manpower shortages during the war:

Sweat . . . sand . . . smoke. Probably from the time the Egyptians built the first foundry some 3800 years ago, the three S's—sweat, sand and smoke—have characterized the foundry industry.

But if modern methods haven't completely eliminated them, plants like Ford's in Brook Park have gone a long way toward making foundry work almost pleasant.

There still is plenty of heat, of course, where metal is melted and poured. But the air is kept clean with modern ventilation and by piping sand through pneumatic tubes.

"I've worked in foundries where the smoke was so thick you couldn't see what you were doing," said one veteran. "This place looks sterilized by comparison."

"Yeah," chimed in another, "I used to scrub for a week to get that sea coal off." Sea coal is the pulverized coal that is mixed with sand to give castings a smooth finish.

Another big change in a modern foundry like Ford's is that most jobs no longer require just brawny men.

Almost everything is automatic, done with pushbuttons. The machines even do the thinking—along with the 2700 folks who work there.

—o—

Career Choice: The 1956 edition of "Career Choice," the student guide to opportunity, published by Career Publications Inc., 757 Garland Drive, Palo Alto, Calif., is a co-operative effort in which employers have joined to describe their organizations and opportunities available to young men and women. It is designed primarily for classroom use at the high school level, but has proved useful to junior college counselors and teachers. It is distributed to students and faculties in the major population centers of California.

The Northern California Chapter of the American Foundrymen's Society is quite proud to have sponsored the foundry section, consisting of a two-page spread entitled "A Future for You in Foundry Work." Illustrations show foundry operations and text points out that every product begins in the foundry, that many skills are needed and that foundrymen are trained. The AFS Chapter offers further information to those who write or call.

Congratulations to the chapter on its effort. F.G.S.

Circle 563 on Inquiry Card→

WHEELABRATOR Swing table

cleans a variety of castings faster, cheaper

HANDLES ENTIRE FOUNDRY PRODUCTION

to speed cleaning at Alloy Steel Castings Co.

Efficient, low-cost cleaning of stainless steel castings ranging in weight from 1 oz. to 600 lbs. is effected by a Wheelabrator Swing Table in the new foundry of Alloy Steel Castings Company in Southampton, Pa. In size, the castings vary from ½" square to 48" in diameter. They are cleaned immediately after shakeout and again after heat treatment.

A spokesman for the company points out that production is speeded because there is no waiting to group castings according to size with the resultant lost time of waiting for a load of any given size to accumulate. Large or small work is cleaned at the same time with equal efficiency.

Although your problem may be different from that of Alloy Steel Castings Company and a different type of Wheelabrator machine be required, you will find the cost-saving speed and thoroughness of Wheelabrator cleaning can be adapted to any cleaning problem. Investigate the money-saving possibilities of the Wheelabrator today.

For more information — Write today for Catalog No. 74C for more details on Wheelabrator airless blast cleaning principles, applications and savings.

WHEELABRATOR
CORPORATION

505 SOUTH BYRKIT STREET
MISHAWAKA, INDIANA

General Tire & Rubber elects

Pangborn Dust Control

for its plant

... and polls a saving of $75,000 a year!

General Tire and Rubber Co., Akron, Ohio, was losing hundreds of pounds of carbon black every day. To control this valuable ingredient in the manufacturing process, General Tire & Rubber installed five Pangborn Dust Collectors and gained three primary benefits. The firm maintains quality control in the manufacturing process by keeping ingredient quantities exact. In the winter the already-heated air can be returned to the plant and re-used after cleaning, resulting in high fuel savings. And finally—a tremendous cost advantage—Pangborn Dust Control permits salvage savings of approximately $75,000 a year!

Pangborn CONTROLS DUST

How do you Vote?

If you're interested in efficient, profitable plant operation, cast this "ballot" for additional information on Pangborn Dust Control. Send to **Pangborn Corp., 1400 Pangborn Blvd., Hagerstown, Md.**

CAST YOUR BALLOT

☐ **Please send me more information on Pangborn Dust Control immediately.**

Name_____

Company_____

Address_____

City_____ Zone_____ State_____

Circle 564 on Inquiry Card—Page 219

Calendar of MEETINGS

Oct. 4-5—Magnesium Association, annual meeting, Drake Hotel, Chicago.

Oct. 8-12—American Welding Society, fall technical meeting, Hotel Cleveland, Cleveland.

Oct. 8-12—American Society for Metals, national metals congress and exposition, Public Auditorium, Cleveland.

Oct. 11-12—Armour Research Foundation, national noise abatement symposium, Hotel Sherman, Chicago.

Oct. 11-12—National Foundry Association, annual meeting, Sheraton-Cadillac Hotel, Detroit.

Oct. 18-20—Foundry Equipment Manufacturer's Association, annual meeting, The Greenbrier, White Sulphur Springs, W. Va.

Oct. 19-20—New England Regional Foundry Conference, Massachusetts Institute of Technology, Cambridge, Mass.

Oct. 19-20—Northwest Regional Foundry Conference, Seattle, Wash.

Oct. 20-23—Conveyor Equipment Manufacturers' Association, annual meeting, The Greenbrier, White Sulphur Springs, W. Va.

Oct. 22-26—National Safety Council, safety congress and exposition, Chicago.

Oct. 25-26—Metals Casting Conference, Purdue University, Lafayette, Ind.

Oct. 29-30—Refractories Institute, fall meeting, The Homestead, Hot Springs, Va.

Oct. 31-Nov. 2—Gray Iron Founders' Society, annual meeting, The Homestead, Hot Springs, Va.

Oct. 31-Nov. 2—Industrial Management Society, time and motion study and management clinic, Hotel Sherman, Chicago.

Nov. 7-9—Steel Founders' Society of America, technical and operating conference, Carter Hotel, Cleveland.

Nov. 8-9—All-Canadian Foundry Conference, sponsored by Eastern Canada, Ontario and British Columbia chapters of AFS, Sheraton-Mount Royal Hotel, Montreal.

Nov. 25-30—American Society of Mechanical Engineers, annual meeting, Hotel Statler, New York.

Nov. 26-30—Third International Automation Exposition, New York Trade Show Bldg., New York.

Nov. 29-30—Michigan Regional Foundry Conference, Union Bldg., University of Michigan, Ann Arbor, Mich.

Dec. 5-7—American Institute of Mining and Metallurgical Engineers, electric furnace steel conference, Morrison Hotel, Chicago.

1957

Jan. 18—Malleable Founders' Society, semi-annual meeting, Hotel Cleveland, Cleveland.

Feb. 4-8—American Society for Testing Materials, committee week and spring meeting, Benjamin Franklin Hotel, Philadelphia.

Feb. 7-8—Malleable Founder's Society, 2nd technical and operating conference, Wade Park Manor, Cleveland.

Feb. 14-15—Wisconsin Regional Foundry Conference, Hotel Schroeder, Milwaukee.

Feb. 21-22—Southeastern Regional Conference, sponsored by Birmingham and Tennessee chapters, AFS, Dinkler-Tutwiler Hotel, Birmingham.

Mar. 13-14—Foundry Educational Foundation, college-industry conference, Hotel Cleveland, Cleveland.

Mar. 15-16—California Regional Conference, Claremont Hotel, Berkeley.

Apr. 10-11—Malleable Founders' Society, market development conference, Edgewater Beach Hotel, Chicago.

Apr. 12-13—East Coast Regional Conference, sponsored by Metropolitan, Chesapeake and Philadelphia chapters, AFS, Benjamin Franklin Hotel, Philadelphia.

May 6-10—American Foundrymen's Society, 61st annual convention Cincinnati.

June 13-14—Malleable Founders' Society, annual meeting, The Broadmoor, Colorado Springs, Colo.

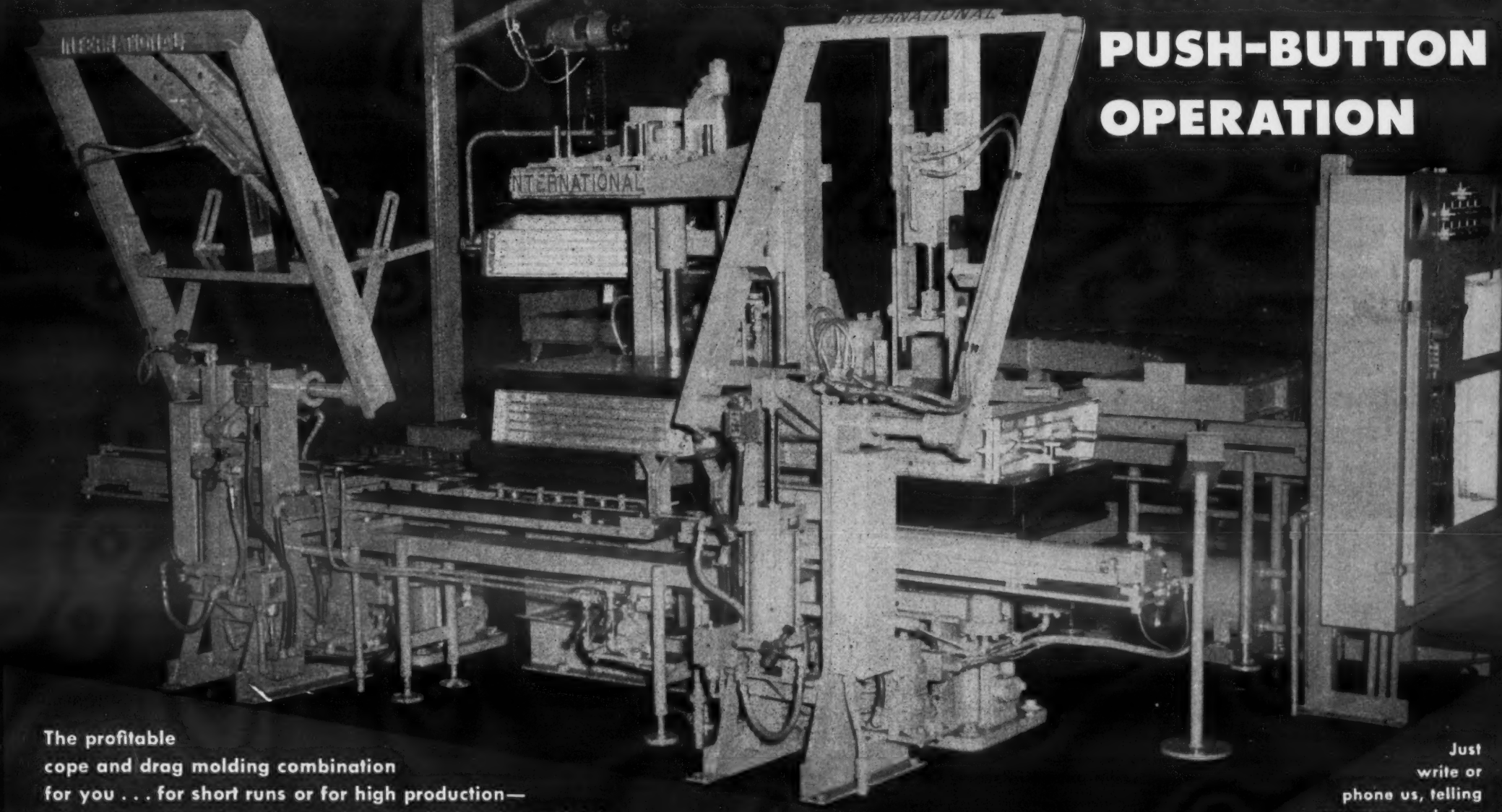
June 16-21—American Society for Testing Materials, annual meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

Here it is ..... INTERNATIONAL'S PRACTICAL

Circle 565 on Inquiry Card→

Here it is..... ...INTERNATIONAL'S

PRACTICAL PUSH-BUTTON OPERATION



The profitable
cope and drag molding combination
for you . . . for short runs or for high production—
all movements automatic—cycle controlled and completely
adjustable to meet all requirements. 750 to 10,000 lb. capacities.

Just
write or
phone us, telling
your cope and drag
sizes. Our engineers will
plan the best combination for
your needs. No obligation.

INTERNATIONAL MOLDING MACHINE CO.

La Grange Park, Illinois

LET'S KICK IT AROUND

BY TOM BARLOW

Do you KNOW what you are buying?

Many years ago, there was a lot of yak about a poem (?): "A rose is a rose is a rose is a rose." The idea was to prove that a rose by any other name would smell. But too often, we foundrymen forget that not all materials can be so easily classed.

When someone says or writes that western bentonite has such-and-such effect, you can use the information directly, allowing only for slight variations based on differences in quality, moisture content, etc. Essentially, bentonite is bentonite is bentonite. But when someone says or writes "wood flour does _____," he hasn't said anything you can use directly until he defines precisely what he means by wood flour.

Cellulose materials from many sources have been used for years to stop scabs, buckles and rat-tails. Although the basic purpose is the same for each, the effectiveness and the effect on other sand properties may be widely different. As different as bad castings and good. Surely, you wouldn't expect the same properties from modern hard wood flour as the old-time molder used to get when using the by-product from the local livery stable. Maybe the old-time additive was better but, with the present shortage of livery stables, the supply is not sufficient to warrant enough research work to prove it.

We have done a lot of work on the other materials, including random mixtures of hard and soft wood (just as they come from the furniture factories and lumber yards), hard maple, rice hulls, furfural residue, corn cobs, flaxseed hulls, tree bark, etc. The details were reported in "Effect of Cellulose Materials," FOUNDRY, April, 1949. This work proved that the flours differ widely—but widely—in their effects on very important sand properties. Rash substitutions could give you real trouble in flowability, finish, toughness, and strength—to say nothing of casting defects such as cuts and washes. For example, hard maple flour increased hot strength at 2000°F. by approximately 100% while "regular" (hard and soft) wood flour *reduced* the hot strength by 30%. (The exact results were 321 psi for hard wood and 111 psi for the other.) Imagine the effect if you are using the wrong one!

Don't try to group all these materials as "wood-flour" and try to draw conclusions. Instead, you should know what effect the particular flour has on *all* the sand properties and then choose on the basis of your needs.

As a parting suggestion, if you want maximum hot strength at 2000°F. combined with maximum flowability, ease of shake-out, effective cleaning and protection against scabs, buckles and rat-tails, you should specify hard maple wood flour. You can be sure if you specify "MAPLEX." Call or write:

EASTERN CLAY PRODUCTS DEPARTMENT, International Minerals & Chemical Corporation, 20 North Wacker Drive, Chicago 6

Schrader 3-WAY PILOT VALVES, which respond to the out-of-phase cam-operated valves, automatically actuate unscrambling actions on conveyor. Some other Schrader Air Products involved in this operation are indicated in red (Numbers 1 through 5).

How Schrader Air Products automatically

unscramble paraffin blocks—unwatched!

Arranging bars of hardened paraffin from a disorganized pile to orderly groups of five, ready for packaging, is a cinch at one New York plant. Schrader Air Products do the job fast and accurately, unattended. Air-activated "fingers" of metal do the trick, as fast as the bars descend the incline.

Every day, new ways are discovered for performing operations automatically with Schrader Air Products. Schrader's line of industrial products includes hundreds of units which can be arranged in limitless combinations for thousands of different jobs. And air always brings to any job its basic economy, safety and efficiency.

Do *you* know the Schrader story in relation to *your* plant's needs? Learn it now, by asking for Schrader engineering assistance in planning for most efficient use of air in your plant. Outline your problems for us and we can help you select the products best suited to your applications. Or, send for the latest informative booklets which show Schrader Air Products that will help you increase production—economically.

Schrader®
ESTABLISHED IN 1844

A. SCHRADER'S SON
Division of Scovill Manufacturing Company, Incorporated
465 Vanderbilt Avenue, Brooklyn 38, N. Y.

FIRST NAME IN THE USE OF AIR
FOR INDUSTRIAL PRODUCTION AND CONTROL

Circle 567 on Inquiry Card—Page 219

E.E.* makes BAY STATE

BAY STATE

ELECTRONIC FORMULATION

● "EF" is the latest "Wheels of Progress" development. Send for your copy of this illustrated descriptive booklet.

Snagging Wheels BETTER!

"Electronic Formulation" is the first use of an electronic "brain" for flawless calculation of grinding wheel ingredients. Its precision is unmatched in the industry.

"EF" GIVES YOU SUPERIOR ACCURACY IN:

★ **SPECIFICATION . . .** When your grinding requirements are analyzed, BAY STATE abrasive engineers have the industry's sharpest specifying tool. "EF's" equal-step, straight-line progression of grade and structure makes this new degree of accuracy practical.

★ **MANUFACTURING . . .** When wheels are made to meet your requirements, each ingredient is determined to the millionth of a pound! The 160 calculations per order are automatically self-checked. You can be certain that the ingredients of your wheels are exactly as prescribed.

★ **DUPLICATION . . . . .** When you reorder BAY STATE wheels, the perfect "memory" of electronically punched cards assures absolute accuracy in duplicating . . . and faster order processing too.

"EF'S" unmatched grinding wheel uniformity brings new dependability to foundry grinding.

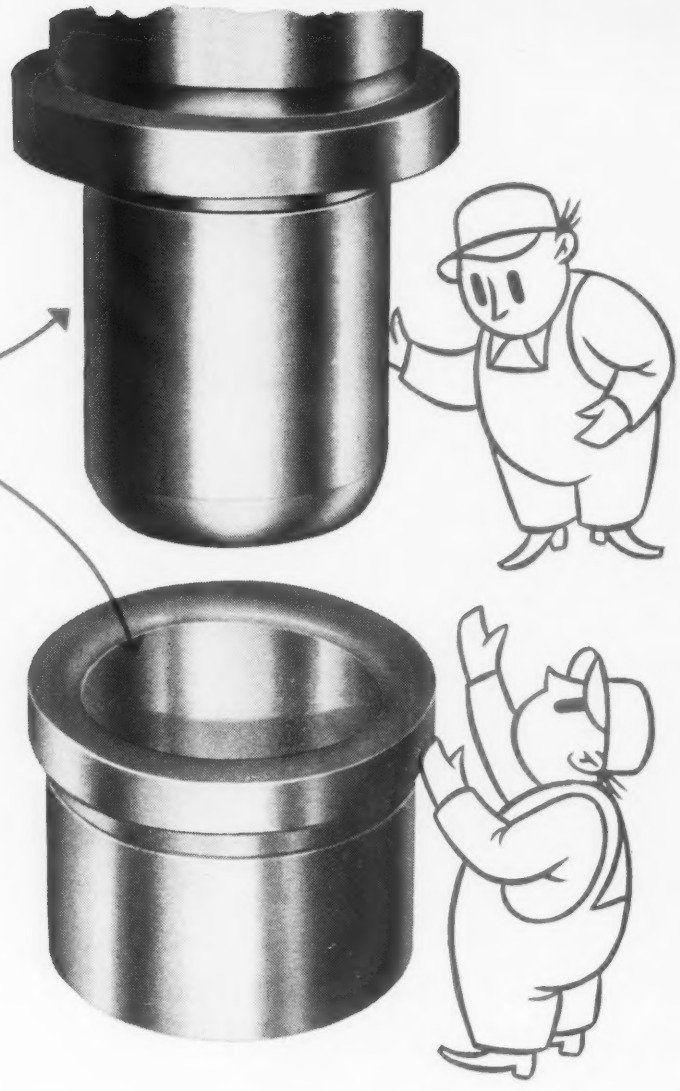
For full engineering benefits from this latest "Wheels of Progress" development, call in your local BAY STATE DISTRIBUTOR.

BAY STATE ABRASIVE PRODUCTS CO.,
Westboro, Mass., U.S.A.

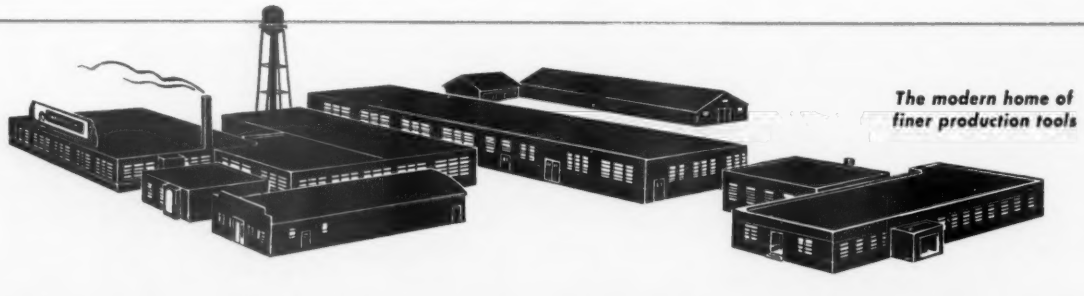
Branch Offices and Warehouses — Bristol, Conn., Chicago, Cleveland, Detroit, Pittsburgh
Distributors — All principal cities
In Canada:
Bay State Abrasive Products Co. (Canada) Ltd., Brantford, Ont.

BAY STATE ®
WHEELS of PROGRESS

carburized and hardened steel wearing surfaces and ductile cores mean long life for UNIVERSAL flask pins and bushings



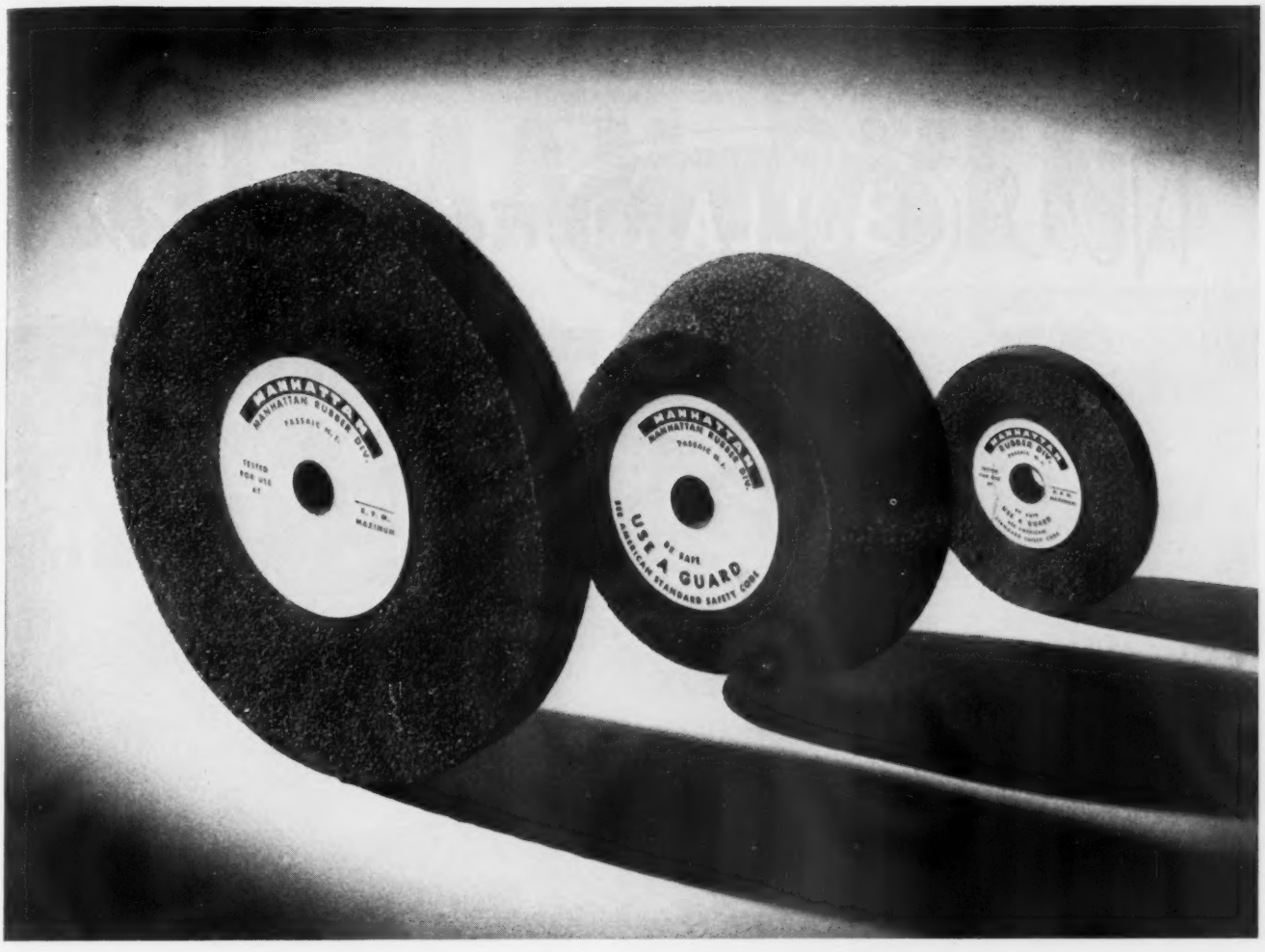
It's no easy trick to produce flask pins and bushings that are hard enough to take long, rigorous wear, and yet have cores ductile enough to resist breakage and rough treatment in the foundry. However, Universal has accomplished this difficult task. Universal flask bushings are double quenched and double drawn to produce a fine grain structure that will withstand considerable stress and strain without breaking or chipping. The wearing surfaces are carburized and hardened to reduce wear and prolong the life of both pin and bushing. Universal flask pins and bushings are precision ground to extremely close tolerances to insure instant, accurate alignment of cope and drag. Plain, taper and threaded series pins and bushings are available in a complete range of sizes as regular stock items. For complete information about Universal flask pins and bushings, write to the office nearest you — Universal Engineering Sales Co., 1060 Broad St., Newark 2, N. J.; 5035 Sixth Ave., Kenosha, Wis. — or the home office.



The modern home of finer production tools

172

UNIVERSAL ENGINEERING COMPANY FRANKENMUTH 4, MICHIGAN



MANHATTAN PORTABLE WHEELS
Lowest Cost for Metal Removed!

Fast cutting action *plus* long wheel life account for more output per man hour and lower production costs with Manhattan Portable Wheels. Individual engineering for each customer's job requirements is the secret of their success. Every phase of the wheel you use—type of abrasive, grain size, hardness, structure and bond—is determined only after a careful analysis of your grinding problems . . . the amount of metal you want to remove, the finish you require.

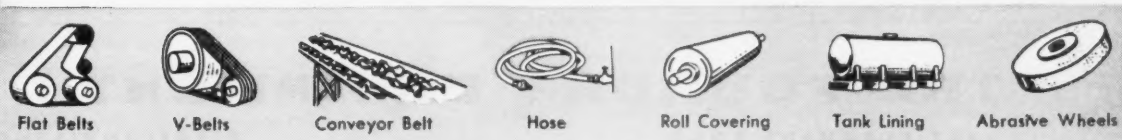
The result is that workers prefer Manhattan Portable Wheels because they get more pieces done. Management prefers them because they assure faster, more uniform quality production . . . and they last longer. Flared cup, raised hub, cone, plug and mounted point, or straight—there's a Manhattan Portable Wheel that can remove *more* metal, *faster*, at *lower* cost on your job.

Let a Manhattan sales engineer show you how you can boost production and reduce costs . . . get "More Use per Dollar" . . . with Manhattan Portable Wheels and other types of high speed, heavy duty abrasive wheels. RM 631

WRITE TO ABRASIVE WHEEL DEPARTMENT

MANHATTAN RUBBER DIVISION—PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.



Flat Belts | V-Belts | Conveyor Belt | Hose | Roll Covering | Tank Lining | Abrasive Wheels

Other R/M products include: Industrial Rubber • Fan Belts • Radiator Hose • Brake Linings • Brake Blocks • Clutch Facings • Asbestos Textiles • Packings • Engineered Plastic, and Sintered Metal Products • Laundry Pads and Covers • Bowling Balls

Circle 570 on Inquiry Card—Page 219

Partners In Progress

New BULLARD Foundry and

Three of the seven Coleman Car Type Core and Mold Ovens for cars 14'6" x 25'0". Push button operated doors at both ends of ovens and electronic controls are among the fully automatic operating features.

For over 75 years Bullard Machine Tools have been known throughout world industries for their high quality. In planning its new foundry Bullard conducted a thorough search for the latest, most efficient methods of production. The important objectives were better quality grey iron castings, lower unit cost, increased production and better working conditions.

Coleman Oven Engineers, called in at the planning stage, provided Bullard Engineers practical assistance based on more than half a century of experience. To accomplish efficient production flow through core baking and mold drying, they recommended 7 large Coleman Car Type Core and Mold Ovens, 6 Coleman Transrack Core Ovens, and a Coleman Continuous High Speed Horizontal Conveyor Redry Oven.

As builders of the world's only complete line of foundry ovens, Coleman Oven Engineers can recommend the right ovens for your needs. It pays to have Coleman help you . . . there's no obligation.

WRITE FOR BULLETIN 54

THE FOUNDRY EQUIPMENT CO.

1821 COLUMBUS ROAD — CLEVELAND 13, OHIO

World's Oldest and Largest Foundry Oven Specialists

COLEMAN OVENS

Only COLEMAN offers a complete line of foundry ovens with all these advantages

RECIRCULATING HEATING OR DIELECTRIC SYSTEMS to meet your requirement best.

DEPENDABLE BAKING AND DRYING. Coleman Ovens remove all uncertainties in core baking and mold drying. Rejects and make-overs are eliminated.

INCREASED LABOR SAVING. Efficient and modern mechanical designs reduce handling and other indirect labor to a minimum.

HEAVY DUTY CONSTRUCTION. Responsible for dependable performance, economical operation, and minimum maintenance cost under rugged service requirements.

MAXIMUM FUEL ECONOMY. Coleman Heating Systems use the most economical fuel available to you — gas, oil, stoker-coal, electricity, etc.

FLEXIBILITY AND ACCURATE CONTROL to bake oil or resin binders — whichever is most satisfactory for your requirements.

BETTER WORKING CONDITIONS. Positive ventilation built into Coleman Ovens prevents leakage of fumes and gases — helps to make the core department a good place to work.

ADVANCED OVEN "KNOW-HOW". Coleman Engineers have pioneered and developed the most efficient oven designs to meet the highly specialized needs of modern foundry methods in all classes of work.

WIDEST EXPERIENCE. Gained through more than half a century of specialization in foundry ovens and the building of over 11,000 successful Coleman Oven installations.

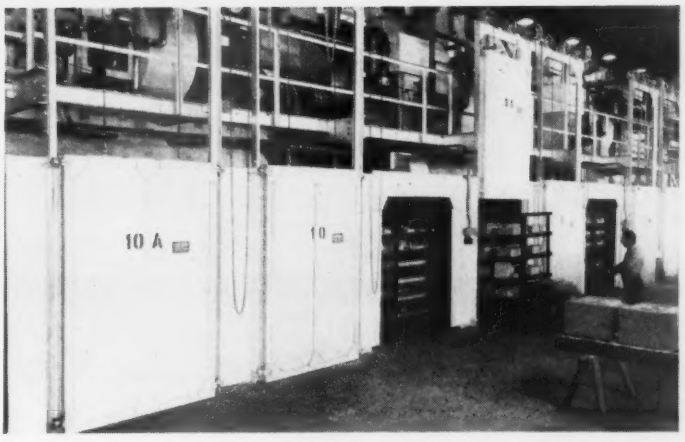
Among the leading machine tool and machinery castings foundries using Coleman Ovens are firms such as:

Cincinnati Milling Machine Co.
Cooper Bessemer Corp.
Farrell-Birmingham Co. Inc.
Bucyrus-Erie Co.
United Engineering & Foundry Co.
Sterling Foundry Co.
Kaukauna Machine Corp.
Worthington Corp.
General Electric Co.
General Steel Castings Corp.
Mesta Machine Co.
Continental Foundry & Machine Co.
Nordberg Manufacturing Co.
Westinghouse Electric Corp.
The Falk Corp.
Clark Brothers Co.
Fairbanks-Morse & Co.

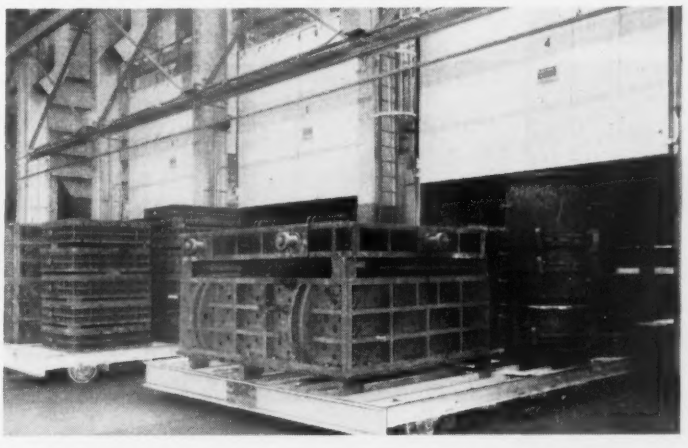
A COMPLETE RANGE OF TYPES AND SIZES . . .

for every core baking and mold drying requirement:

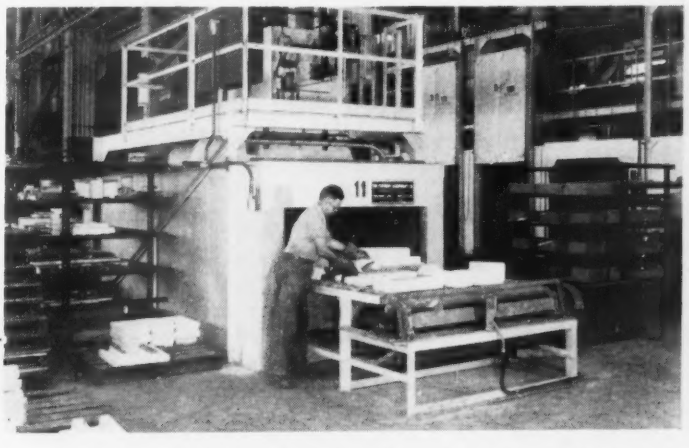
Tower Ovens • Horizontal Conveyor Ovens • Car-Type Core Ovens • Car-Type Mold Ovens • Transrack Ovens Rolling Drawer Ovens • Portable Core Ovens Portable Mold Dryers • Dielectric Core Ovens



Small and medium cores are baked in a battery of six Coleman Transrack Core Ovens, each taking two 4′ x 6′ x 6′ portable core racks. Unique compensating forced air cooling chambers located between each pair of ovens.



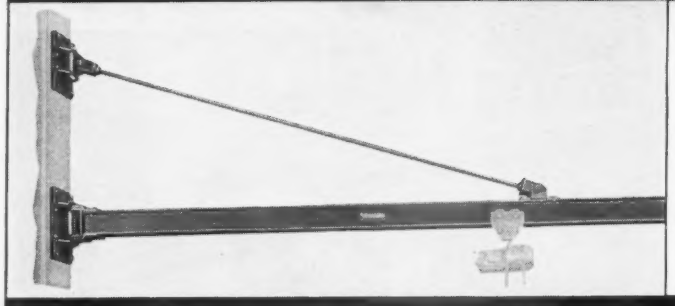
150 ton capacity Coleman Oven cars move 60 feet from loading, through oven to unloading by means of push button sub-floor car haul systems.



Coleman Continuous High Speed Horizontal Conveyor Redry Oven with 5′0″ wide x 25′0″ long tunnel dries washed cores in 15 minutes.

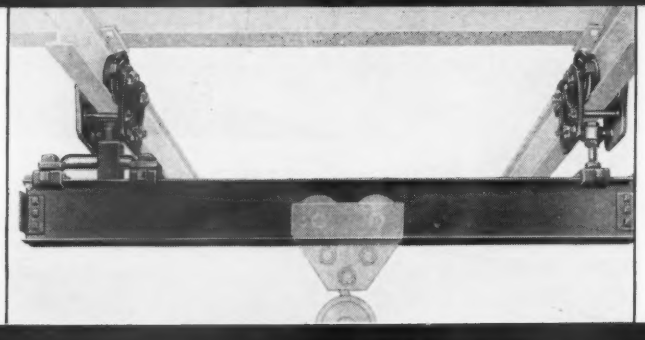
Circle 571 on Inquiry Card—Page 219

The solution to your foundry problems often hang on ONE of R-W's BIG 3



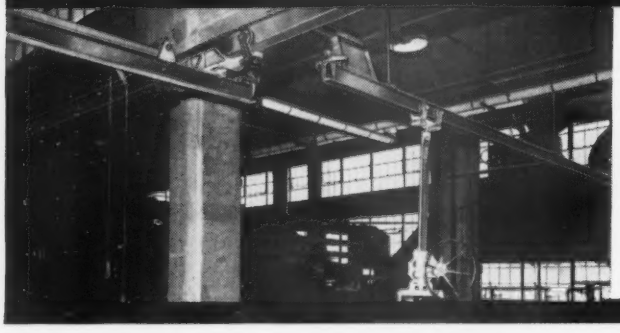
R-W 939
Swinging Jib Crane

. . . is most commonly used with the rod support (above), but is also available with curved track for supporting outer end of boom. Available in a wide variety of sizes with capacities up to 4000-lbs.



R-W 971
Flexible Traveling Crane

. . . yoke and cross head are self-adjusting to variations in track span . . . crane cannot bind because bridge need not maintain right angles to tracks. Available in many sizes with capacities up to 8000-lbs.



R-W 3900 Series Tru-Tred
Crane and Monorail

. . . combines ladle handling with maximum smoothness and safety, plus 100% utilization of pouring floor area. Transfer crane with safety interlocks at transfer points provides utmost flexibility and easy handling throughout pouring operations.

. . . quality engineered for precise performance!

Today's featured performers in many modern foundries, are Richards-Wilcox cranes and Monorail conveyors. That's because these material handling systems are scientifically engineered to cut costs, break bottlenecks, speed production—while operating with safety and efficiency at low cost.

Your problem—whether it involves a single unit for a particular handling step, or a complete system for your overall operation—can often be solved *best*, with economical Richards-Wilcox equipment.

Why not lay your foundry material handling problems before a Richards-Wilcox engineer today. He can show you, without cost or obligation, how to effect remarkable savings in time, money and maintenance.

Richards-Wilcox
MANUFACTURING COMPANY
Materials Handling Division

466 W. THIRD STREET, AURORA, ILLINOIS • Branches in Principal Cities

SLIDING DOOR HANGERS & TRACK • ELECTRIC DOOR OPERATORS • FIRE DOORS & FIXTURES • INDUSTRIAL DOORS & EQUIPMENT • INDUSTRIAL CONVEYORS & CRANES SCHOOL WARDROBES & PARTITIONS

GENERAL REFRACTORIES

you live with BRICK . . . 24 hours a day!

365 days and nights a year—wherever you go and whatever you do—you come in contact with products born in and from refractory brick.

Your car and everything in it . . . the cement you drive on . . . the gasoline that powers you—*everything* you see or touch . . . everything that's made or moves owes its very existence to refractory brick. Refractories—containing and controlling the many flames of industry—produce the steel, electric power, rubber and cement you use *continuously* in daily living.

Therefore, the making of refractory products is the most basically necessary industry there is. Refractories, you see, create industry . . . without them, there would be no industry.

Providing industry with Castables, Plastics, Ramming Mixes, Fire Brick, Mortars, Insulating Brick and Insulation, General Refractories Company draws resources from all over the globe—and operates the world's largest, most-modern refractories research laboratory.

A Complete Refractories Service
GENERAL REFRACTORIES COMPANY
Philadelphia 2, Pa.

A COMPLETE REFRACTORIES SERVICE FOR THE FOUNDRY INDUSTRY

BRIKRAM 80, a high alumina ramming mix, is giving outstanding service in many foundry furnace applications.

BRIKRAM 80 when rammed in place behind rigid forms, forms an excellent refractory lining wherein temperature and resistance to strong flux or slags are desired. BRIKRAM 80 is used to construct the lower side walls and bottoms of aluminum melting and holding furnaces, center sections of electric furnace roofs and side walls and bottoms of malleable iron furnaces.

BRIKRAM 80, because of its high alumina content, is recommended for use in desulphurizing units where soda ash and other potent fluxes are used. Ladle life can also be increased by using BRIKRAM 80 in the places where the severe wear occurs. In case of ladles holding high temperature stainless steel, or other metals, long service is given by BRIKRAM 80.

For abrasion conditions, HIGH STRENGTH BRIKRAM 80 is available. This material takes a very hard air set and maintains it up to the softening point of the material.

Consult your local GREFCO representative for more complete details of these, and other GREFCO, products.

Circle 573 on Inquiry Card—Page 219

LET'S LOOK at

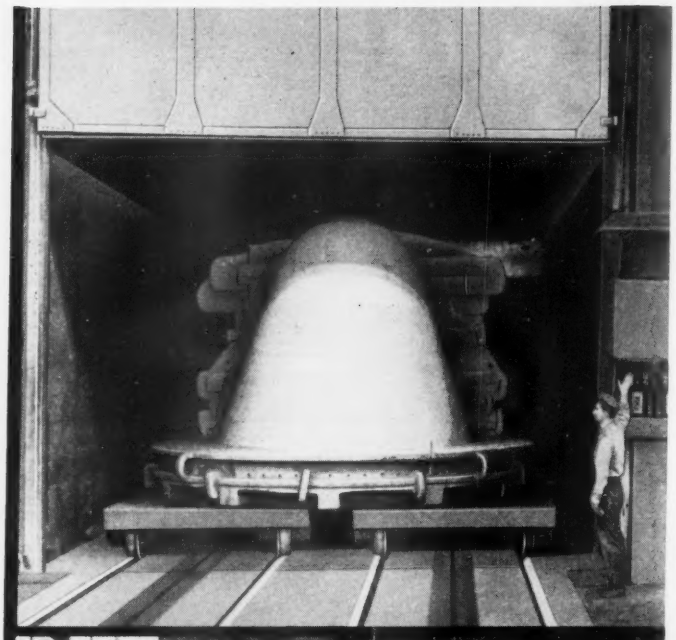
OVENS for every baking requirement

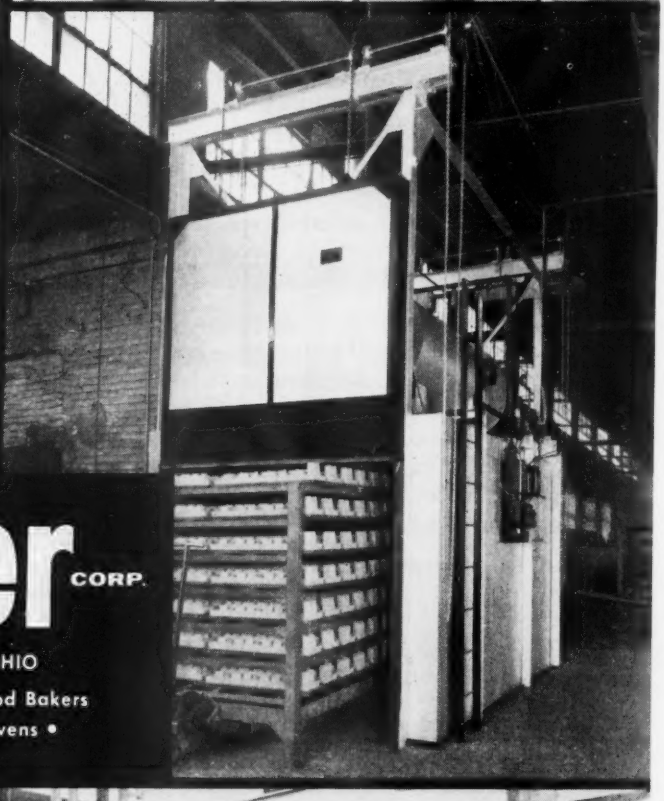
OVENS that will be faster and less expensive to operate

OVENS that are designed to best fit your operation

Carl Mayer designs and manufactures all types of ovens as well as "specials" to meet unusual operating conditions. Most incorporate the Carl Mayer recirculating heating system with sealed combustion chamber that keeps gases from prematurely escaping into the load area. Cores and molds are baked evenly with no burning. Temperatures are always under control.

Write for Bulletin 53-CM





TOP RIGHT—This large car type mold oven is installed at Pittsburgh Steel Foundry. Its special triple slotted panel construction reduces heat loss 1/3. Fuel savings up to 50% over old conventional methods are possible. Drying time is often cut in half and temperatures are uniformly controlled.

MIDDLE RIGHT—This rack type core baking oven is at the Fremont Foundry Co., Fremont, Ohio. It is equipped with a recirculating combination gas-oil fired heating system.

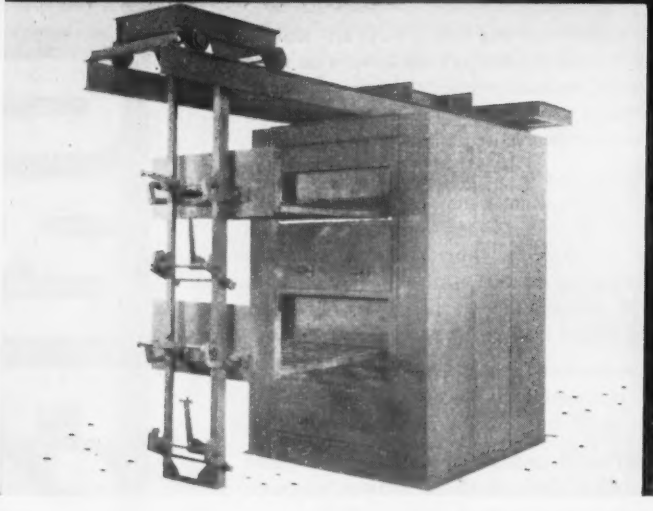
BOTTOM RIGHT—Vertical Core Oven (unloading position) at A. C. Williams Company, Ravenna, Ohio. This oven is 11'-0" wide x 11'0" deep & 45'-0" high.

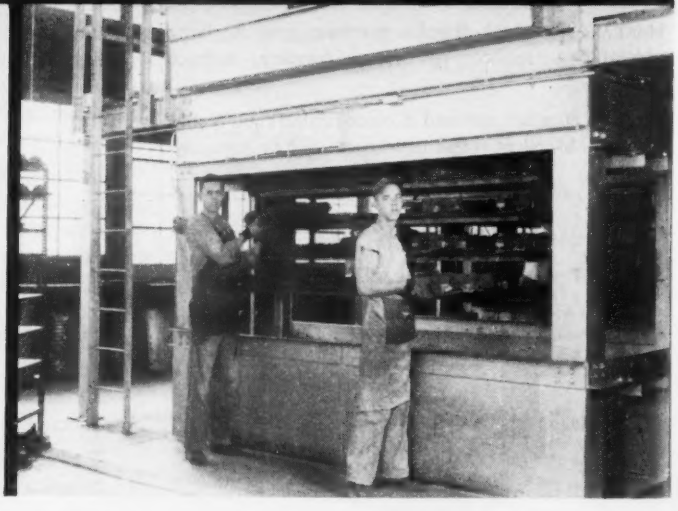
BELOW—Our standard rolling drawer type core baking oven. The heating equipment (not shown) may be mounted on floor beside unit or on the roof. Particularly adaptable to brass and aluminum foundries.

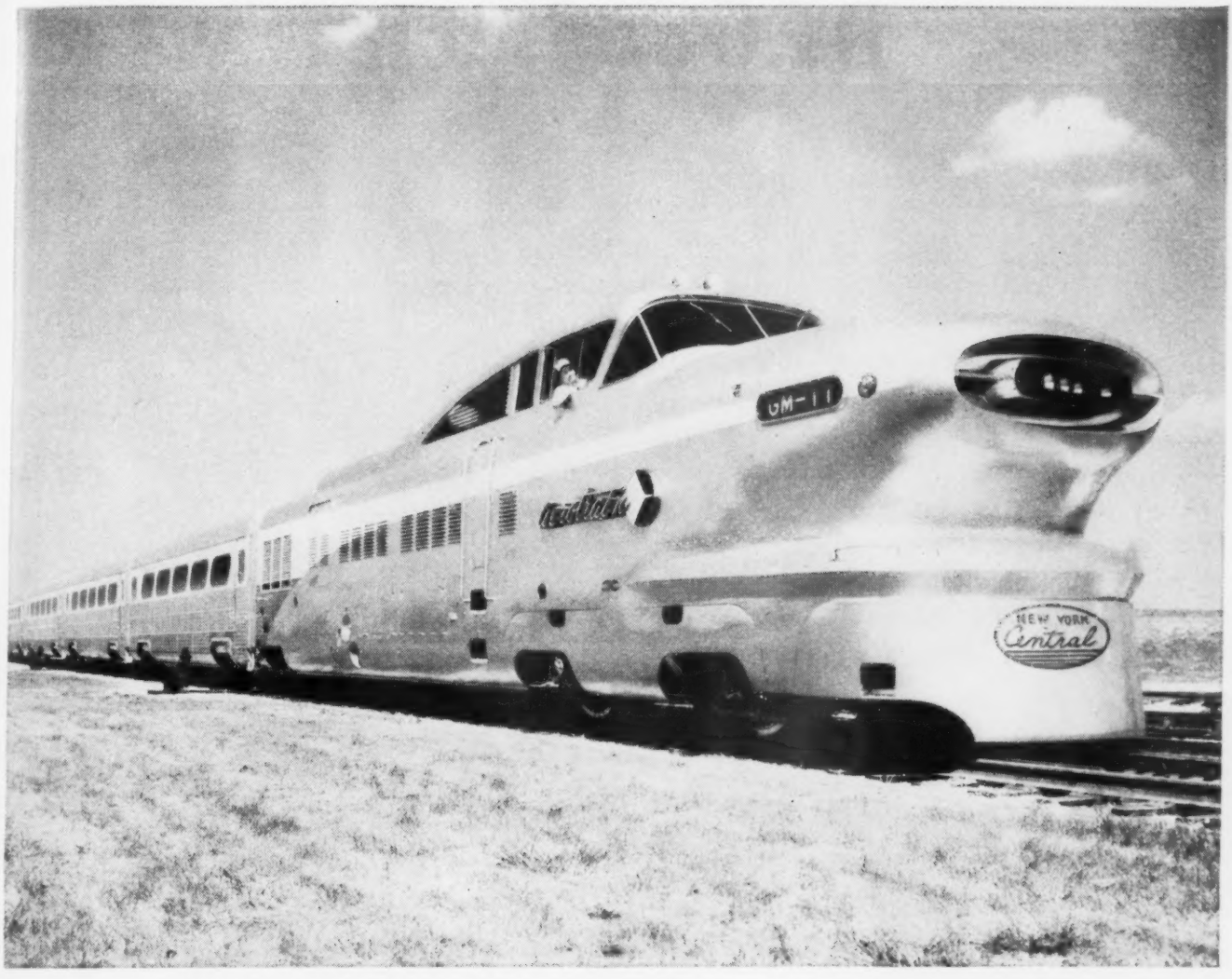
THE carl mayer CORP.

3030 EUCLID AVENUE CLEVELAND 15, OHIO

OTHER PRODUCTS: Heat Treating Ovens and Furnaces • Rod Bakers • Welding Rod Ovens • Paint and Ceramic Drying Ovens • Special Processing Equipment and Accessories







MODERN DESIGN—The New York Central's Aerotrain is typical of the "trains of tomorrow" which went in service this year on the nation's railroads. Castings are vital to such progress.

TRULINE® BINDER KEEPS FOUNDRIES ON SCHEDULE

With many of the nation's foundries working at or near capacity, the important advantages offered by Truline are of special importance.

Throughout the foundry—in the core room, in the molds, in the cleaning room—Truline improves efficiency, reduces man-hours per ton.

Truline's quick bake prevents oven bottlenecks; permits one oven to do almost the work of two. And Truline means strong cores and less breakage. Cores are easily removed by knockout or hydroblast due to Truline's collapsibility.

We'll be glad to discuss the advantages of Truline with you. Write for information:

HERCULES

NF56-1

Pine Chemicals Division, Naval Stores Department

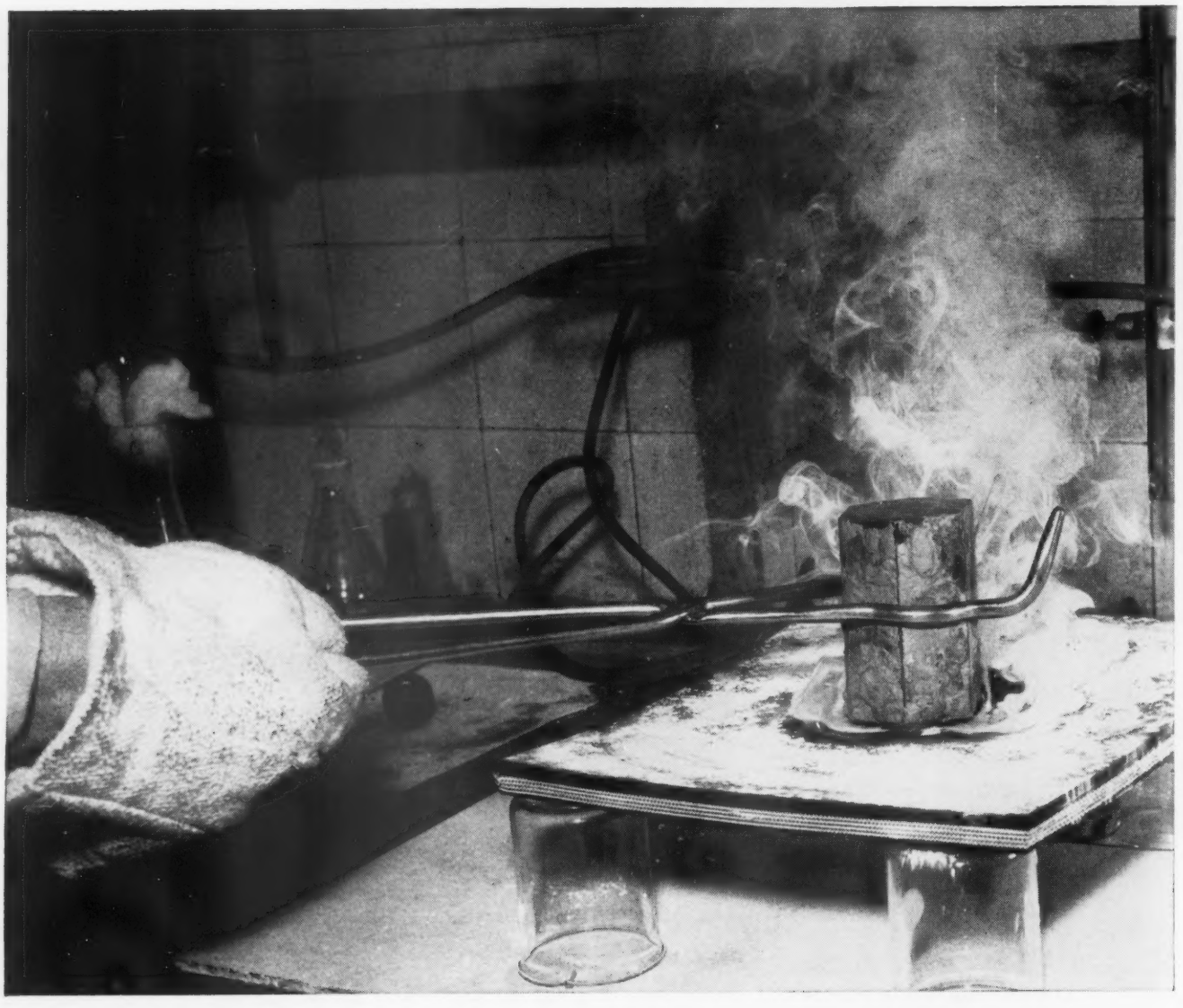
HERCULES POWDER COMPANY

INCORPORATED

920 King Street, Wilmington 99, Del.

Circle 575 on Inquiry Card—Page 219

B.F.Goodrich



Red-hot metal won't burn through this B.F.Goodrich conveyor belt

New fire curtain means longer life for hot-material belts

SCORCHING chunks of metal that sometimes land on foundry conveyor belts won't burn holes through a B. F. Goodrich conveyor belt with the built-in fire curtain.

This new protective shield is two layers of glass fabric that B. F. Goodrich puts into the top cover of hot-material conveyor belts. If a hot chunk of metal accidentally drops on the belt, the rubber cover chars at the spot, but only down to the glass fabric fire curtain. Since the hot object doesn't penetrate the glass fabric barrier, the belt keeps its strength and so, of course, lasts longer than belts without this protection.

To demonstrate the effectiveness of the fire curtain, tests were run on two hot-material belts. One belt had the B. F. Goodrich fire curtain protection; the other did not. A red-hot steel bar was placed on each belt. It burned through the rubber covers on both belts. And it burned a hole clear through the unprotected belt. But the B. F. Goodrich fire curtain stopped the burning chunk, so that the body of the protected belt was undamaged.

The fire curtain protection is ideal for foundry service where burnt holes are the major cause of short belt life. It can be built into any B. F. Goodrich hot-material belt. Talk it over with a B. F. Goodrich distributor and see if this new belting improvement is the answer to your hot material problems. *B. F. Goodrich Industrial Products Company, Dept. M-750, Akron 18, Ohio.*

B.F.Goodrich

INDUSTRIAL PRODUCTS

cedar heights

BONDING CLAY

with

high dry strength

Let us furnish
a free sample
for your examination

FROM THE WORLD'S FINEST CLAY DEPOSITS

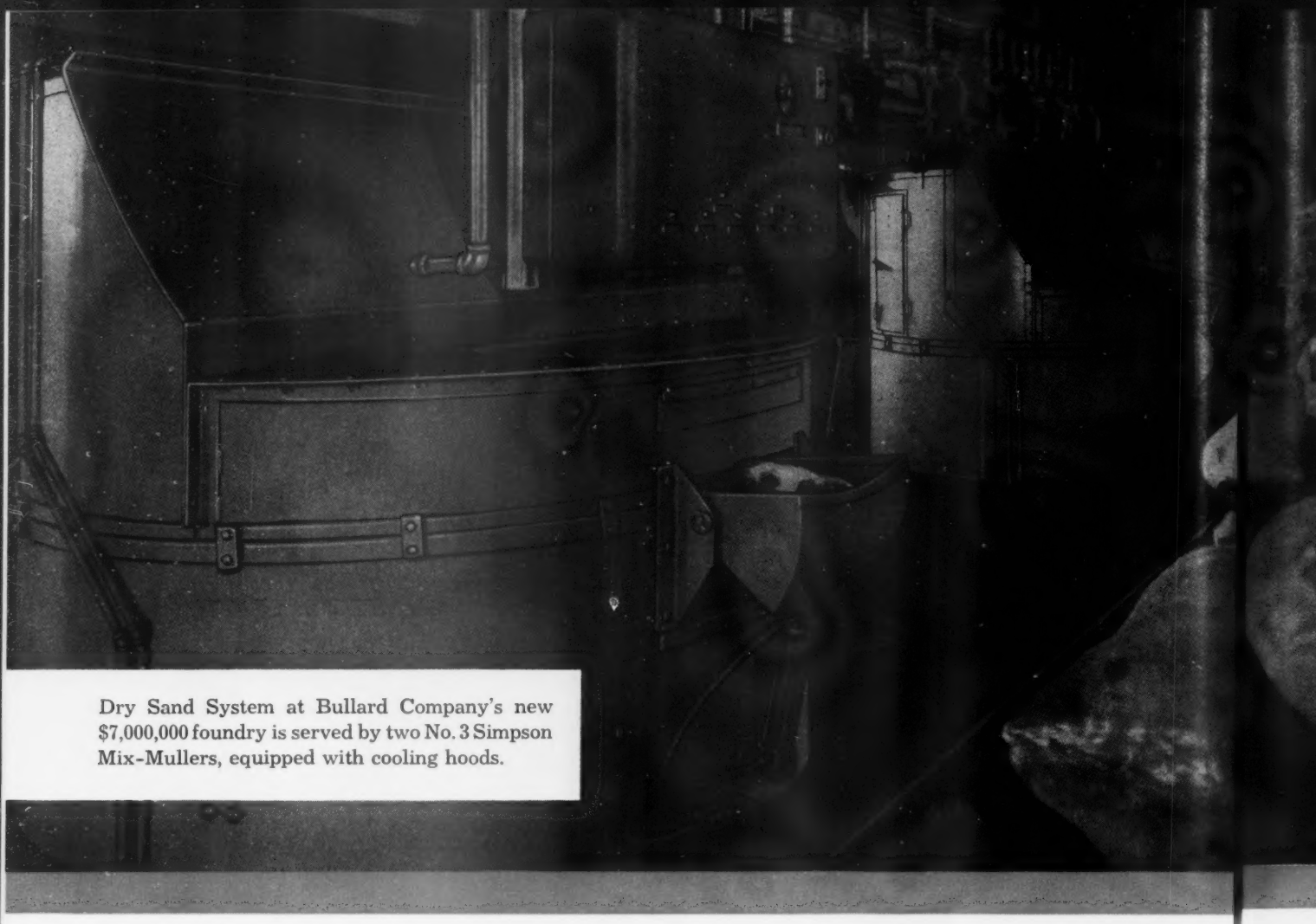
★

High refractory value, high green strength, high dry strength at high temperatures! For the bonding agent with greater durability and economy ask for, and insist on getting, Cedar Heights "Bond." Produced in No. 8, 12, 16, 20, 30, and 50 meshes.

Makes a smooth, working sand and saves you money, too.

Can be shipped anywhere, anytime. See your distributor today.

CEDAR HEIGHTS CLAY 50 PORTSMOUTH ROAD OAK HILL, OHIO **COMPANY**



Dry Sand System at Bullard Company's new $7,000,000 foundry is served by two No. 3 Simpson Mix-Mullers, equipped with cooling hoods.

Simpson Mix-Mullers prepare all sand in new $7,000,000 Bullard foundry

. . . another vote of confidence in 48 years of serving nation's increasing demand for **Bullard Machine tools.**

For more than seventy-five years, The Bullard Company at Bridgeport, Connecticut has been designing and building high quality machine tools for the metal-working industry. To meet the ever increasing demands for its products, they have just completed one of New England's largest foundries for producing grey iron castings.

The Bullard Company bought their first Simpson Mix-Muller in 1918 and Mix-Mullers have, exclusively, served every increase in production since. In 1951 they added a National-Engineered, Mix-Muller equipped, dry sand system. Production demand increased 300% in the first 9 months that this unit was in service, yet the resulting increase in manpower was held to a moderate 100%. Since then, *four more* Mix-Mullers have taken their place in the new Bullard foundry—the latest, to meet an even larger production requirement resulting from a new, heavier, Model 75 line of Bullard Machines . . . and an already mushrooming demand for Bullard-quality jobbing castings.

National's growth with The Bullard Company, through 38 years of meeting production schedules is typical of the confidence with which Industry Leaders look to NATIONAL—*Products of the Practical Foundryman* . . . wherever metals are cast.

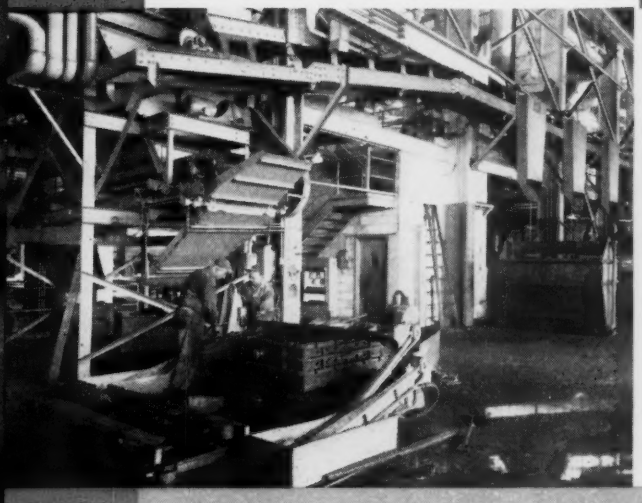
Circle 578 on Inquiry Card—Page 219

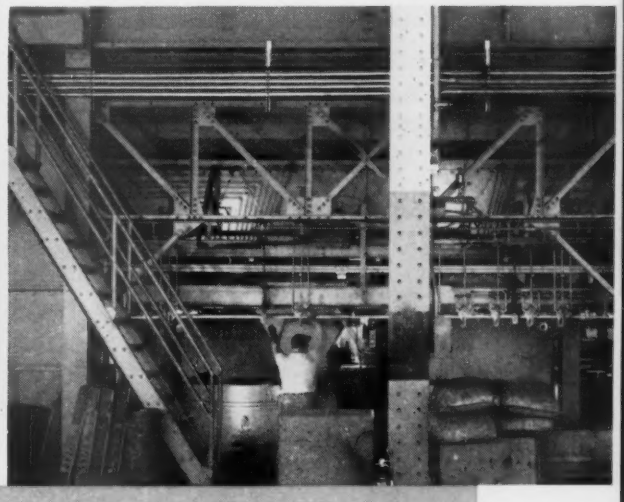
NATIONAL ENGINEERED DRY SAND SYSTEM

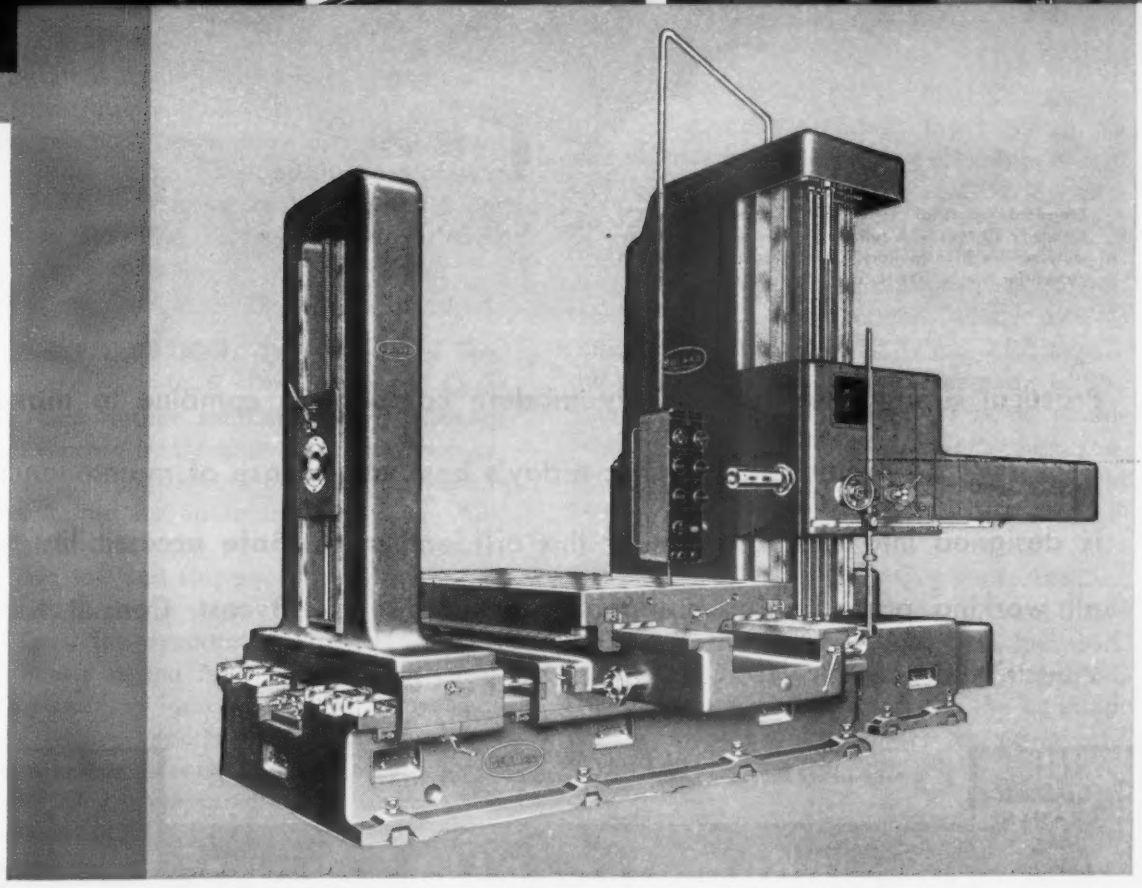
(Below left) Sand serves large roll-over molding machine (left center of photo) and two, one ton per minute, slinger machines (hopper at right of photo) via distributing belt (top of photo). The system also prepares sand for large cores.

TWO NO. 2F MIX-MULLERS

(Below right) Two No. 2F Mix-Mullers prepare green sand for medium size castings. They are molded from permanently mounted patterns with stationary type hydro-slinger. Mix-Mullers also serve oil-type core sand system and cupola lining material system.





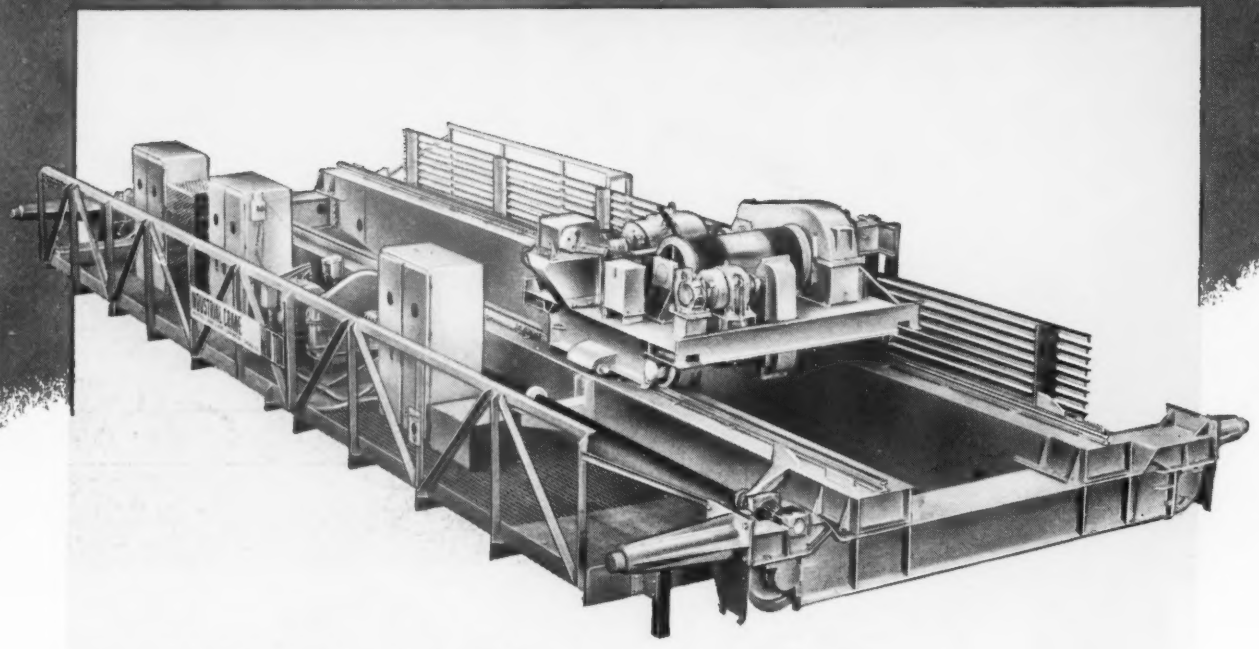


NATIONAL Engineering Company

646 Machinery Hall Building

CHICAGO 6, ILLINOIS

Industrial STANDARD HEAVY DUTY CRANES are TODAY'S BEST VALUE



Standard Industrial Heavy Duty Crane Span 46'0", Capacity 10 tons with full magnetic control for heavy duty service in a foundry. Other models available in capacities up to 100 tons.

Practical design plus high quality modern components combine to make Industrial Heavy Duty Cranes today's best value. Ease of maintenance is designed into every section of this efficient crane. Safe accessibility to all working parts insures top performance with lowest cost. Consult with Industrial Crane and Hoist engineers for your next crane.

Industrial CRANES

Designers and Builders of Overhead Cranes, Jib Cranes, Gantrys and Monorail Systems.

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INDUSTRIAL CRANE & HOIST

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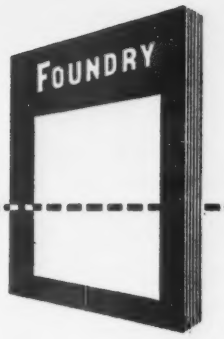
Late News



PRICES CHANGE: Electro Metallurgical Co., Division of Union Carbide & Carbon Corp., New York, has increased prices on a number of ferroalloys. Increases were effective Sept. 14 to apply to contract users on Oct. 1. The weighted average of these price increases is 5.16 per cent. Climax Molybdenum Co. of Michigan has raised base prices of pure metallic molybdenum an average of 20 per cent and lowered those for molybdenum-base alloys an average of 30 per cent.

FERROUS CASTINGS SHIPMENTS: Shipments of gray iron castings in June were 1,152,156 short tons, 7 per cent below May and 11 per cent below June, 1955, shipments. For malleable iron, June shipments were 75,635 short tons, 6 per cent below May and 24 per cent below June, 1955. Steel castings shipments were 164,661 short tons for June, down 8 per cent from May but 23 per cent higher than June, 1955, shipments.

SCRAP EXPORTATION: The Bureau of Foreign Commerce, U. S. Department of Commerce, has further simplified export license bills governing iron and steel scrap exporters. Exporters no longer are required to submit bills of lading for on-board shipments. Also the quantity of scrap need not be limited to a carload lot, and shipments need not be restricted to a single shipment on a single carrier. Thus, the exportation of scrap is made much easier in the face of efforts by metalworking industry groups to get the government to reduce exports because of the critical scrap situation in some sections of the country. Scrap exports have risen to the point where the total for 1954 and 1955 is believed to equal half the total tonnage shipped in the previous 54 years.

Exports for the first half of 1956, exclusive of shipments to Canada, were 2,530,060 short tons compared with 2,460,828 short tons for the first half of 1955. It is estimated that shipments to Canada would bring the first half 1956 figure to a total of 2,800,000 short tons.

For the last half of this year shipments to England are expected to drop off, but exports to Japan may exceed greatly those of the first half. That is a significant development in view of a report at a recent meeting of the management group of Los Angeles gray iron foundries that Japanese soil pipe fittings are selling for 33 to 40 per cent less than those produced by West Coast foundries. Japanese finished machined gray iron burners also are below the cost of similar rough castings produced on the coast. One foundry producing gray iron fittings stopped production because it could not meet such competition.

EXPANSION PROGRAMS: Alter Co., Davenport, Iowa, has purchased the physical assets of Davenport Besler Corp., Davenport, and will install electric furnace facilities for producing master nickel alloys. The addition will increase Alter's present capacity by 400 per cent. Brooks & Perkins Inc., Detroit, and Dominion Magnesium Ltd., Toronto, jointly plan to build a $7 million plant in Selma, Ala., to produce high purity magnesium. The plant will be operated under the name of Alabama Metallurgical Corp. In addition to magnesium, production of other chemical and metallurgical products is being considered.

FOUNDRY CLOSES: Lake City Malleable Inc., Ashtabula, O., has been sold to National Distillers Products Corp., New York. U. S. Industrial Chemicals Co., a National Distillers division, will produce zirconium sponge in the building. Foundry production and office equipment will be sold at auction Oct. 2.

FORMS NEW CORPORATION: Consolidated Foundries & Mfg. Corp., Chicago, has formed Crucible Mfg. Corp. in Milwaukee to operate as branches the Crucible Steel Casting Co., Milwaukee; Crucible Steel Casting Co., Clevelan, and Ebaloy Foundries Co., Rockford, Ill. George W. Myers, former president of Milwaukee Crucible Steel, is president of the new

corporation. Richard A. McBride will be president of Crucible Steel in Milwaukee, and Charles Locke, president of the Cleveland foundry. Harry R. Gessner, former secretary of Crucible Steel in Milwaukee, will be secretary-treasurer of the new company.

OBITUARY: Herbert Thacker Herr Jr., 58, president, J. S. McCormick Co., Pittsburgh, died Aug. 31 at his summer residence, Ahmic Lake, Ontario, Canada . . . Joseph W. C. Bullard Sr., 74, retired vice president and member of the board of directors of the Bullard Co., Bridgeport, Conn., died Sept. 16 . . . Arthur M. Malone, 61, superintendent, Brost Pattern & Casting Co., Cleveland, died Sept. 22. Mr. Malone previously had been with Aluminum Co. of America for 26 years.

PERSONALS: Donald L. LaVelle has been appointed assistant pig and ingot product manager, Kaiser Aluminum & Chemical Sales . . . Frank C. Riecks, technical assistant to the manager of foundries, Ford Motor Co., has retired after 40 years with the company . . . Horace B. McCoy has been made administrator of the Business and Defense Services Administration, U. S. Department of Commerce. He succeeds Charles F. Honeywell, who is resigning effective Oct. 15.

MISCELLANY: Wheland Co., Chattanooga, Tenn., is postponing a $6.9 million financing program for expansion. The firm will modify its present facilities to enlarge the foundry and to make room for a new division, Wheland Products Division . . . Oregon City Foundry, Oregon City, Oreg., has been leased to Valley Foundry & Mfg. Co., Salem, Oreg. . . . Pangborn Corp., Hagerstown, Md., has signed an exclusive licensing agreement with Hepburn Conveyor Co., Wakefield, England, for sole manufacturing and sales rights of Pangborn equipment in England, Scotland, Wales, Ireland, Australia, New Zealand and the Union of South Africa . . . Allis-Chalmers Mfg. Co., Milwaukee, is expected to announce shortly plans for licensing foundries to use its patented process for production of nodular iron . . . Arrow Pattern & Engineering Co., Erie, Pa., has opened a new shell mold plant, Arrow Shell Cast, on Nagle Road, Erie. It will produce aluminum and copper-base alloy castings.

Prices of Foundry Metals and Coke

(As of Sept. 24, 1956)

FOUNDRY COKE

(Per net ton, f.o.b. ovens)

BEEHIVE	
Connellsville	$17.00-18.00
OVEN	
Birmingham	$27.60
Buffalo	29.50
Detroit	29.50
Erie, Pa.	27.50
Indianapolis	28.75
Kearny, N. J.	28.75
Lone Star, Tex.	25.50
Milwaukee	29.50
Montreal, Que.	28.50
Neville Island (Pittsburgh)	28.25
New England, deld.	30.55
Painesville, O.	29.50
Philadelphia	28.50
St. Louis	28.50
St. Paul	28.50
Swedeland, Pa.	28.50
Terre Haute, Ind.	28.75

PIG IRON

(Per gross ton f.o.b. furnace)

	No. 2 Foundry	Malleable
Birdsboro, Pa.	$65.00	$65.50
Birmingham	59.00	63.00
Buffalo	63.00	63.50
Chicago	63.00	63.00
Cleveland	63.00	63.00
Duluth	63.00	63.00
Erie, Pa.	63.00	63.00
Everett, Mass.	63.75	64.25
Fontana, Calif.	70.50	....
Geneva, Utah	63.00	....
Granite City, Ill.	64.90	65.40
Lone Star, Tex.	59.00	....
Neville Island (Pittsburgh)	63.00	63.00
Steelton, Pa.	65.00	65.50
Swedeland, Pa.	65.00	65.50
Toledo, O.	63.00	63.00
Troy, N. Y.	65.00	65.50
Youngstown, O.	....	63.00

NONFERROUS INGOT

(Cents per pound, carlots)

BRASS AND BRONZE: Red brass, No. 115, 37.55; tin bronze, No. 225, 48.00; No. 245, 43.50; high-leaded tin bronze, No. 305, 41.00; No. 1 yellow, No. 405, 29.75; manganese bronze, No. 421, 33.00.

ALUMINUM: 99 per cent plus primary ingots 27.10. Secondary No. 12 alloy 26.50. Deoxidizing grades: No. 1 26.25; No. 4 24.25.

MAGNESIUM: 99.8 per cent notched ingots 36.00, f.o.b. Velasco, Tex. (10,000 lb or more).

COPPER: Electrolytic 40.00 delivered Connecticut valley.

ZINC: High grade 14.85 delivered. Die casting alloy No. 3, 18.00, No. 2, 19.00, delivered.

IRON AND STEEL SCRAP

(Consumer prices per gross ton delivered, except as otherwise noted)

	No. 1 Heavy Melting Steel	No. 1 Cupola Cast	Heavy Breakable Cast	Clean Auto Cast	Machinery Cast	Malleable	Short Steel Rails
Birmingham	$42.00-43.00	**51.00-52.00	.....	.....	.....	.....	71.00-72.00
Boston*	**51.00-51.50	**44.00-44.50	.....	.....	**45.50-46.00	.....	.....
Buffalo	56.00-57.00	**47.00-48.00	.....	.....	**53.00-54.00	.....	77.00-78.00
Chicago	61.00-62.00	53.00-54.00	.....	57.00-58.00	57.00-58.00	71.00-72.00	82.00-83.00
Cincinnati*	**57.00-58.00	**48.00-49.00	**47.00-48.00	.....	**58.00-59.00	.....	77.00-78.00
Cleveland	62.50-63.50	57.00-58.00	48.00-49.00	56.00-57.00	59.00-60.00	70.00-71.00	83.00-85.00
Detroit*	**55.00	**48.00	**41.00	**53.00	.....	**52.00	.....
Los Angeles	44.00	**46.00	.....	.....	.....	.....	.....
New York*	53.00-54.00	46.00-47.00	48.00-48.50	.....	.....	.....	.....
Philadelphia	59.00	53.00-55.00	56.00-57.00	.....	58.00-59.00	68.00	76.00-77.00
Pittsburgh	58.00-59.00	54.00-55.00	49.00-50.00	.....	58.00-59.00	.....	78.00-80.00
St. Louis*	53.00	50.00	44.00	54.00	.....	.....	82.00
San Francisco	50.00	55.00	42.00	55.00	55.00	.....	.....
Seattle	50.00	46.00-48.00	42.00-44.00	.....	.....	.....	.....

*Brokers' buying prices. **F.o.b. shipping point

Get ALL THESE 12 ADVANTAGES IN ONE READY-TO-USE CORE PASTE

LYQUAGRIP*

1. Ready mixed, uniform at all times
2. Light Colored, odorless, non-corrosive, non-fermenting
3. Dries rapidly at room temperatures
4. Unaffected by normal storage
5. Will not boil or blister
6. No appreciable gas generation
7. Pasted joints are stronger than core
8. Unaffected by mold humidity
9. For pasting CO^2 cores
10. Extra strong, uses 1/3 to 1/5 as much paste
11. Cores may be reheated without damaging pasted joints
12. Washes off hands and tools easily with warm water

* Trade Mark Reg.

Send for Literature

Whitehead Brothers COMPANY

Established 1841

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324 West 23rd St., New York 11, N. Y.

NEW ENGLAND OFFICE
17 Exchange Place, Providence, R. I.

Manufacturers of

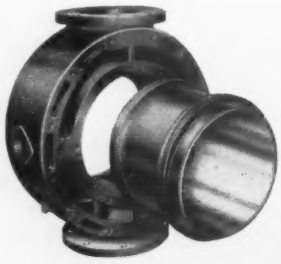
LYQUAFLOUR
For cleaner surfaces, better shakeout

JOINT SEAL
Plastic compound for perfect sealing

LYQUAFACE
The liquid sand grain coating

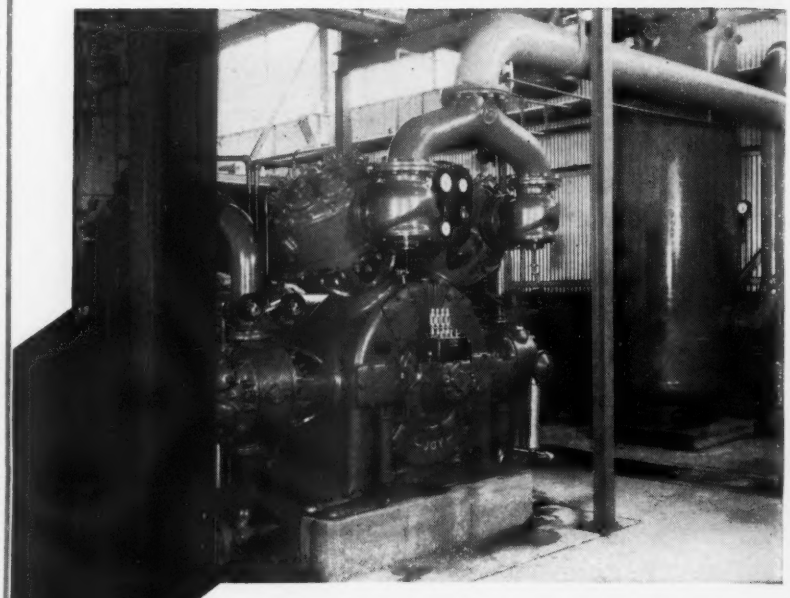
DOB-IT
Ready-to-use core mudding compound

Circle 580 on Inquiry Card—Page 219



CYLINDER AND LINER

CROSSHEAD GUIDE



JOY WN-114 heavy-duty, two-stage, double-acting compressor. Capacity 1186 to 1948 CFM, 125 psi.

You get a free "Insurance Policy" with the JOY WN-114 Compressor

Joy's replaceable cylinder liners and crosshead guides are your "Insurance Policy" against down-time and lost production. They eliminate reboring . . . a replacement liner can be installed quickly and easily by your regular maintenance personnel. The liner itself is made of a special iron alloy, honed to a surface smoothness of four micro-inches.

Joy WN-114 compressors have full force-feed lubrication to all friction-bearing surfaces. The compact, semi-radial cylinder arrangement and exact crankshaft counterweighting give proper balance . . . eliminate vibration wear and tear. Joy "Dual Cushion" valves run quietly without valve shock . . . have extra large air passages to minimize air friction.

These features are built into every Joy heavy-duty compressor, whether for continuous service at standard plant pressures, high or low pressures, or vacuum pump applications. Be 'insured' against air power interruptions . . . for more information write ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pennsylvania.*** In Canada, *Joy Manufacturing Company, (Canada) Galt, Ontario.*

Send for free bulletin 126-13.

Consult a Joy Engineer

For Air and Gas Compressors, Oxygen and Nitrogen Generators, Vacuum Pumps and Boosters, Conveyors, Fans, Electrical Connectors, Hydraulic Fittings and Hose Assemblies.

WSW-I 6251-126

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SPECIALISTS IN THE COMPRESSION AND MOVEMENT OF AIR AND GASES SINCE 1885

Pangborn Rotoblast Table-Room at Worthington Corporation, Holyoke, Mass., "reduced two full shifts to one shift daily . . . gives perfect finish, cleans 2½ times faster than previous equipment."

Pangborn Rotoblast® gives "perfect" finish at Worthington Corporation!

And "cleans cleaner than pickling acid" at Brydon Brass!

Rotoblast Blastmaster® Barrel at Brydon Brass Mfg. Co., Toronto, Canada, "cleans cleaner than pickling acid . . . we're enthusiastic and completely endorse the cleaning quality."

Industrial parts today must have a high quality finish for many reasons—production facility, operating efficiency, consumer demand. Pangborn Rotoblast gives such a finish—thoroughly cleaned, uniform—and does it *quickly.* As a result, you get a top-notch cleaning job and greatly increased production with lower operating, labor and reject costs. Write for further details to see what Rotoblast can accomplish for *you.* Send for Bulletin 227 to PANGBORN CORPORATION, 1400 Pangborn Blvd., Hagerstown, Md. *Manufacturers of Blast Cleaning and Dust Control Equipment.*

Visit our Booth 1901, National Metals Show, Cleveland, October 8 to 12

Pangborn

BLAST CLEANS CHEAPER

Rotoblast Blastmaster® & Continuous-Flo Barrel

Rotoblast Tables & Table-Rooms

Special Blast Rooms & Cabinets

Pangborn Dust Control Equipment

Distributors for Malleabrasive and Tru-Steel Abrasives 28

Circle 582 on Inquiry Card—Page 219

for heavy duty work...choose a

HERMAN

JOLT MACHINE

HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH 22, PA.

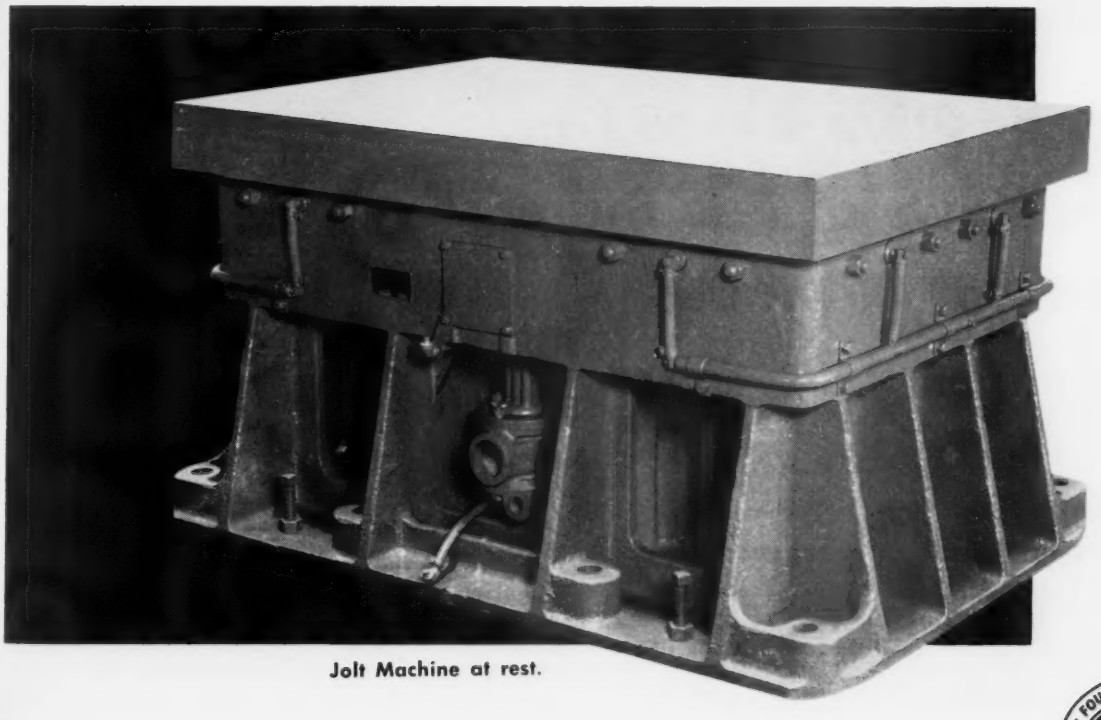
The Herman Jolt Machine illustrated here is ideally suited for heavy duty requirements in a wide capacity range.

It's designed to strike over the entire surface of the machine base to permit ramming a harder mold without damage . . . to allow the handling of capacities from 615 to 140,000 lbs. . . . and to reduce maintenance and production costs.

All Herman Jolt Machines have cast steel table plates and plungers. Wearing plates at the corners of the machine base maintain constant alignment and minimize wear at the cylinder and plunger. Every unit has the Herman "bunter control" operating valve which proportions the amount of air to the load on the machine.

The Herman Jolt Machine is another in the complete line of Herman molding machines, in all types and sizes, to fit every foundry operation. Write today for our catalog No. GC-11-53, or call the Herman sales engineer in your area.

Jolt Machine with table plate and plungers removed for examination.



Jolt Machine at rest.

MEMBER FEMA FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC.

HERMAN

Best Known Name in Molding Machines

Circle 583 on Inquiry Card—Page 219

SUPERAY "A" sets the standards:

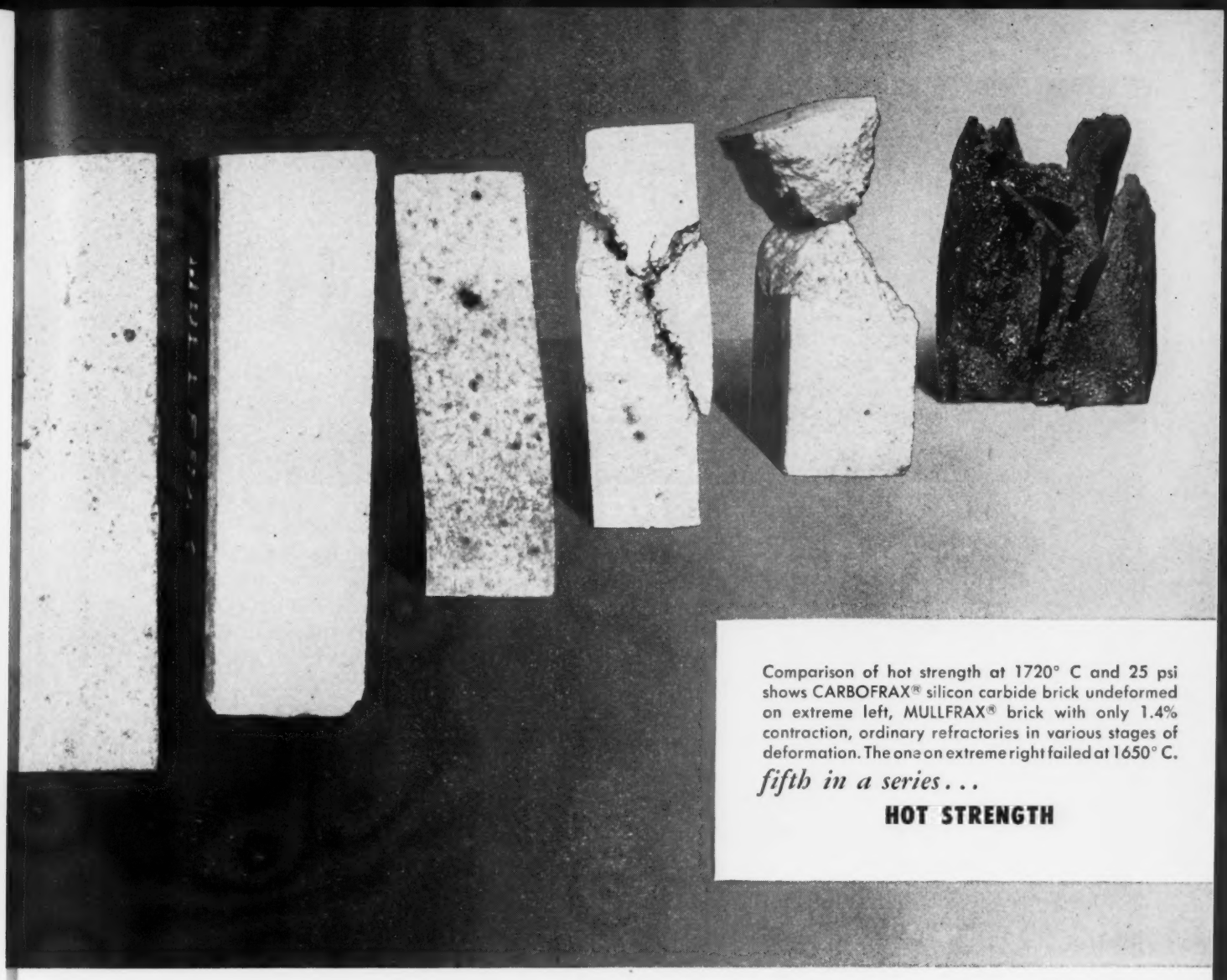
Super-sensitive Ansco Film detects flaws of less than 1% of total thickness

Sensitive Ansco Superay "A" industrial x-ray film can actually detect flaws of less than 1% at certain thicknesses. Super-fast, as well, it slashes seconds and minutes from exposing times at low voltages and *hours* from inspection time when using radioactive isotopes. First and still the finest all purpose film tailored to meet the demands of industrial radiography, Superay "A" has increased its following every year since its introduction. *It's the standard by which all other industrial X-ray films are measured.*

America's oldest maker of photographic materials...Ansco

BINGHAMTON, NEW YORK

A Division of General Aniline & Film Corporation



Comparison of hot strength at 1720° C and 25 psi shows CARBOFRAX® silicon carbide brick undeformed on extreme left, MULLFRAX® brick with only 1.4% contraction, ordinary refractories in various stages of deformation. The one on extreme right failed at 1650° C.

fifth in a series . . .

HOT STRENGTH

Unusual Properties of Refractory Materials

Hot Strength—When load is applied to a refractory its ability to resist heat is lessened. Increasing either load or temperature, or both, often causes the refractory to fail.

As these factors are combined in most installations — large and small — hot strength of a refractory takes on new value.

The effect of temperature in combination with load is shown by specimens pictured above. Further tests provided these data: In a test under 50 psi, a MULLFRAX® electric furnace mullite brick showed no linear contraction when held at 1500°C for 100 hours. Ordinary brick contracted an average of 7.58% at 1500°C but that at only 35 psi. In another typical case complete failure (15% contraction) was experienced with a commonly-used refractory at 1350°C and a load of 25 psi.

These differences in hot strength prove this: Where refractories fail under load and temperature, Carborundum refractories have the *extra* resistance needed to avoid slumping and, thereby, to effect less downtime, lowered maintenance costs and greater output.

Hot strength may work in another way, too. It permits use of thinner section refractories, thus reducing overall load. More insulation may be used to lower heat losses.

Carborundum's magazine "Refractories" pinpoints many practical applications for these unusual products. The next issue carries a feature article on "hot strength". Send for your copy today.

CARBORUNDUM

Registered Trade Mark

VALUABLE INFORMATION FOR USERS OF:

REFRACTORIES • CASTABLE CEMENTS • POROUS PLATES AND TUBES

CATALYST SUPPORTS • OXIDE, BORIDE, NITRIDE AND CARBIDE

HIGH-TEMPERATURE MATERIALS • CERAMIC FIBER

all in the new magazine "Refractories"

MAIL THIS COUPON TODAY

Dept. A106, Refractories Division
The Carborundum Company, Perth Amboy, N. J.

Please send me the forthcoming issue of "Refractories".

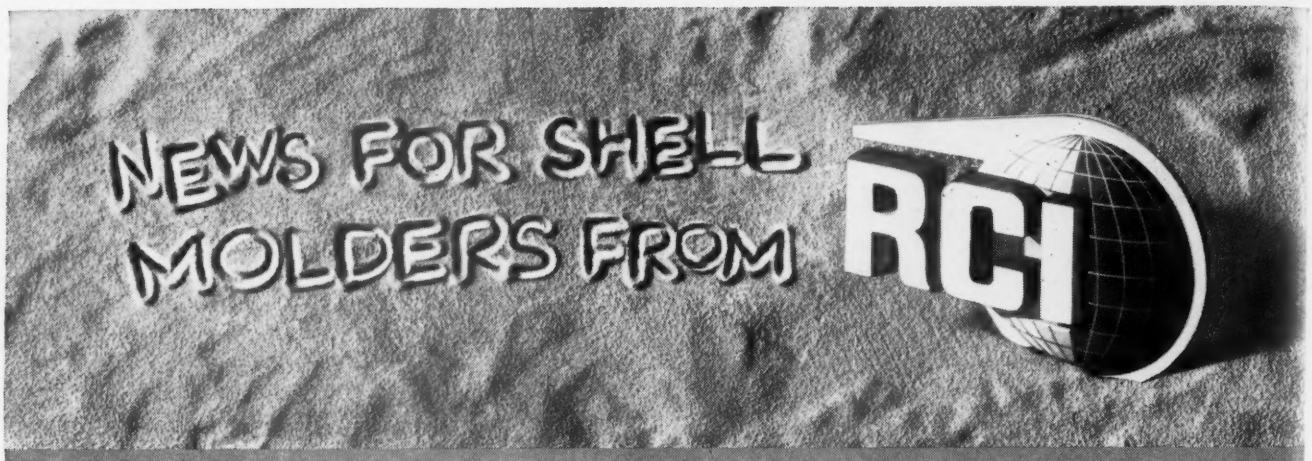
Name_____ **Title**_____

Company_____

Street_____

City_____ **Zone**_____ **State**_____

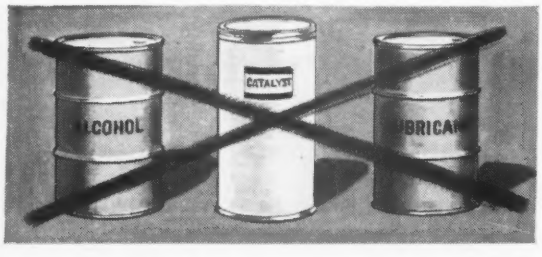
Circle 585 on Inquiry Card—Page 219



New RCI system simplifies cold coating of sand

May be used for producing shell molds or shell cores by dump box or blowing methods

Now, with the new RCI system, *all you need is two materials* for cold coating sand (besides the sand). One is a powdered phenolic resin, RCI FOUNDREZ 7555. The other is an alcohol solution of a phenolic resin, RCI FOUNDREZ 7150.



No longer do you need to purchase and handle alcohol, catalysts, lubricants and so forth.

Amount of resin needed: The amount of resin required for a given mix will, of course, depend on whether you are coating sand for dump-box operation or for blowing shells and cores (and will vary considerably with the type of sand used). But the experience of RCI Technical Service men in the field indicates that for shell cores about 2-4% resin will be satisfactory. For dump-box operations or blown shells a range of 3-5% will generally be enough.

Other Advantages of RCI coating system

1. **Speed of coating**—release of alcohol from the resin itself accelerates actual coating of the sand. You cut mulling time about 35 to 45% . . . **reduce resin dust, too.**
2. **Strength of bond**—because the RCI system coats more efficiently than the powder and alcohol method, you get greater dry tensile strength (on an equal solids basis). You also get better economy and reduced gas content.
3. **Rate of production**—lowered investment time as well as cure time with this system gives you a higher rate of production for both cores and molds.
4. **Release characteristics**—you will find a marked improvement in the ease with which cores and molds are released from the boxes and patterns.
5. **Resin stability**—both the powdered resin, FOUNDREZ 7555, and the liquid resin, FOUNDREZ 7150 are very stable. You can store them for long periods of time (the powdered resin kept cool and dry to prevent lumping).

Write for full information. If you would like to know the procedure and typical formulations for simplified cold coating with the new RCI system, write today for *Technical Bulletin F-10.*

Creative Chemistry . . .
Your Partner in Progress

RCI

REICHHOLD

Synthetic Resins • Chemical Colors • Industrial Adhesives • Plasticizers
Phenol • Formaldehyde • Glycerine • Phthalic Anhydride • Maleic Anhydride
Sodium Sulfite • Pentaerythritol • Pentachlorophenol • Sulfuric Acid

REICHHOLD CHEMICALS, INC., RCI BUILDING, WHITE PLAINS, N. Y.

Circle 586 on Inquiry Card —Page 219

Introducing the NEW CAST-MASTER

MAGNESIUM

HOT CHAMBER
Die Casting Machine

Now, for the First Time, a High Speed Process that makes it Possible to Produce Magnesium Castings at a New Low Cost!

The new Cast-Master Model-M for die casting magnesium, brings to the industry a safer, faster, more economical method for producing magnesium castings than ever before. The machine embodies the same fine features of other Cast-Master die casting machines. The "Dow type" hot end for die casting magnesium is used for metal injection. This end is similar to a zinc hot chamber arrangement thereby eliminating the disadvantage of hand ladling and making high speed production possible.

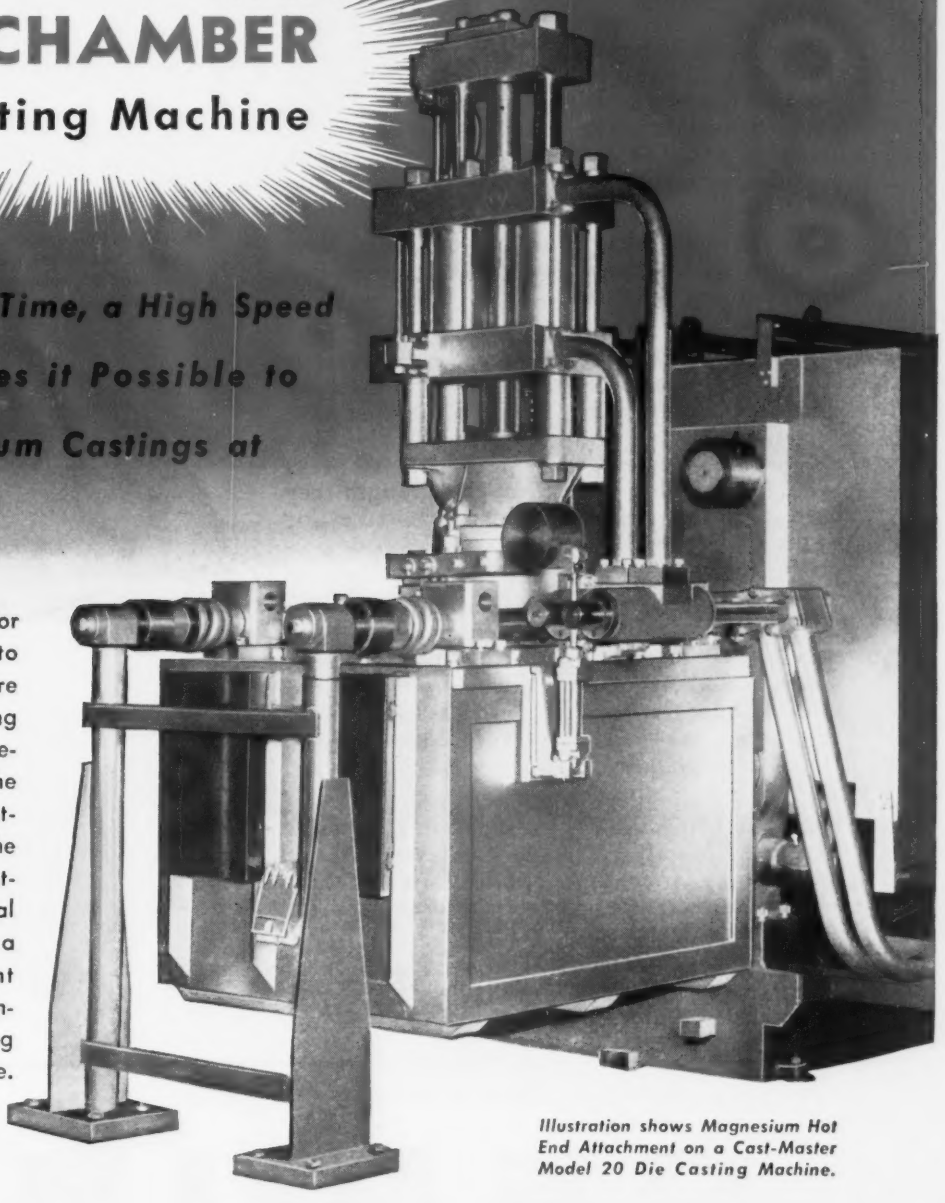
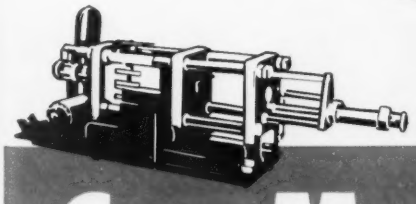


Illustration shows Magnesium Hot End Attachment on a Cast-Master Model 20 Die Casting Machine.



Eastern Rep. MILTON HARMON, 18 Rock Rd., Milford, Connecticut

CAST-MASTER *Inc.* **23901 AURORA ROAD**
BEDFORD, OHIO

R. Hoe & Co., Inc., Specifies Chateaugay Pig Iron for

INCREASED STRENGTH, BETTER MACHINABILITY

When a modern printing press operates at full speed, tons of metal parts get into action in precise relationship to each other. . . within tolerances closer than the thickness of the paper being printed. As a result, press design must provide both enormous strength and extreme accuracy.

For these reasons, R. Hoe & Co., Inc., New York, insists on Chateaugay, Republic's exclusive premium pig iron, for castings used in their complete line of printing presses.

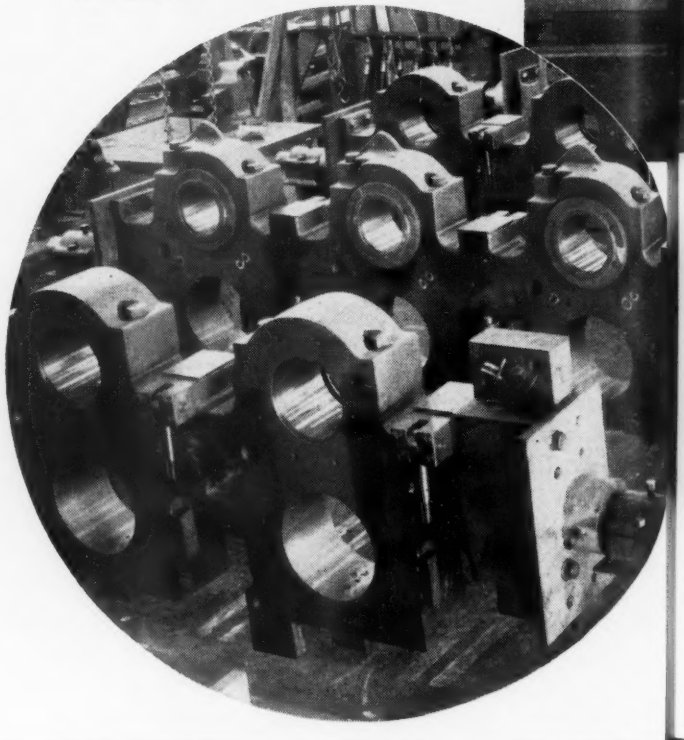
In order to maintain firsthand control of quality, Hoe operates its own foundry and machine shop at Dunellen, New Jersey. Here they have gained extensive working experience with Chateaugay in producing a wide variety of press parts. They find it gives them the strength they need, plus fine grain structure which makes for better machinability . . . the foundation for precise operation of the completed press.

Chateaugay offers superior characteristics which make it ideal for many current applications. It promotes uniform metal structure, which results in improved tensile strength and internal quality of castings. It improves wear-resistance and provides exceptionally good machined finish.

Consider all of these advantages in terms of your own production . . . and call in a Republic Pig Iron Metallurgist. He can assist you in determining your best applications for low-phosphorous, copper-free Chateaugay Pig Iron. Simply mail the coupon, today.

UNIFORM MACHINABILITY of Chateaugay Pig Iron pays off in the planing operation shown right. Here, many multi-color press side frames are machined simultaneously.

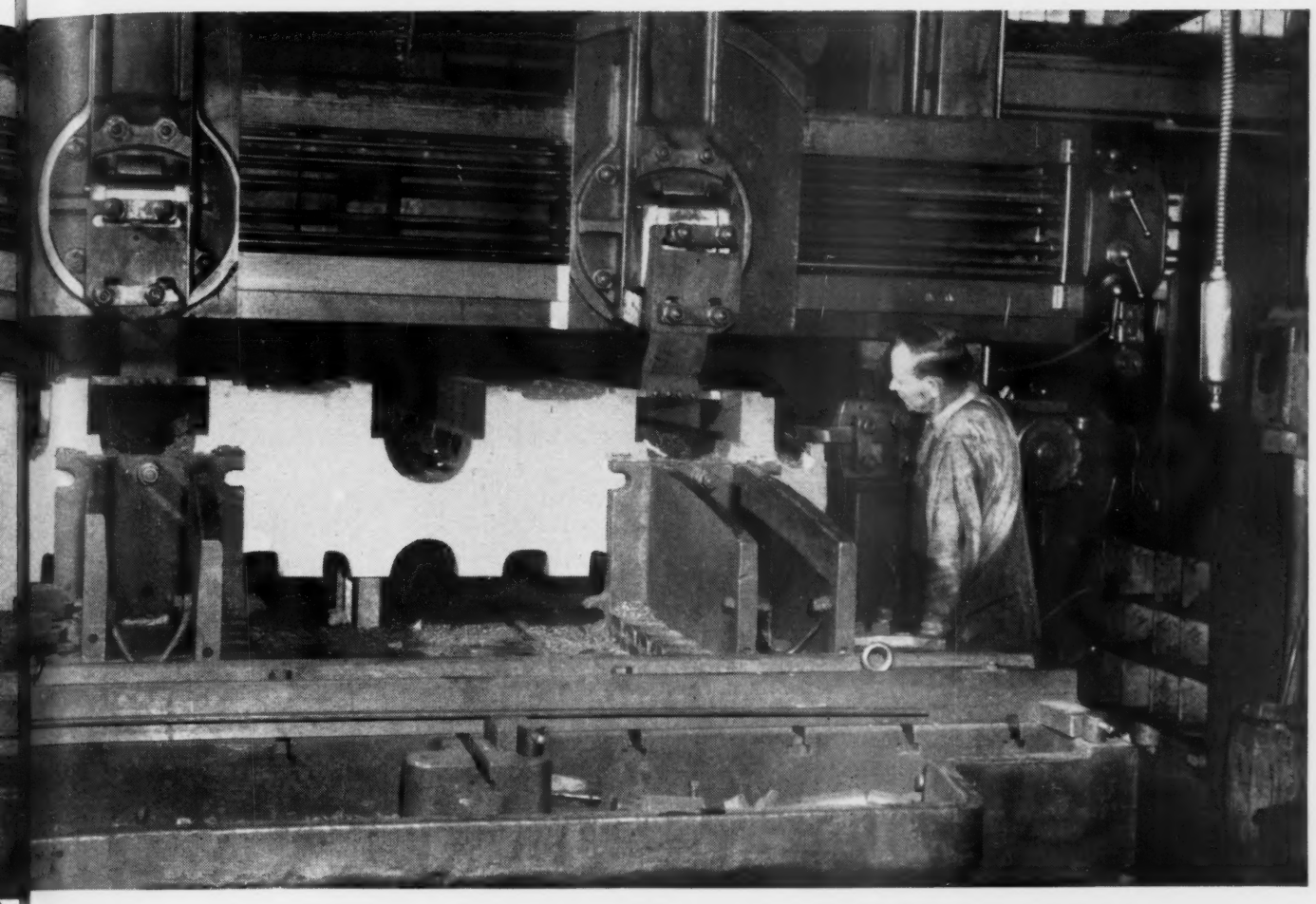
CHATEAUGAY'S GREAT STRENGTH is an important factor in the design of these magazine press side frames. R. Hoe and Co., Inc., also specifies Chateaugay for bed plates, ink rails, paper roll arms, housings, brackets, columns, braces, cylinders and other vital cast parts.



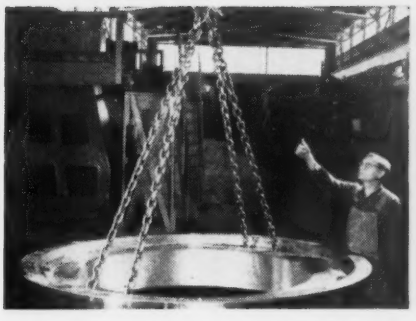
REPUBLIC

REPUBLIC STEEL

World's Widest Range of Standard Steels



STRENGTH MEANS DURABILITY in Republic's complete line of Materials Handling Equipment. For example, these PB-130 Box and Skid Units are equipped with stacking brackets and tiering lugs. Their durable, ribbed construction permits high stacking, freeing maximum floor space for production equipment and materials' movement. For information on entire line, mail coupon.



STRENGTH MEANS SAFETY when you specify Republic Chain Products. No matter what your production or product application, Republic can furnish the right chain and accessories from a selection including electric welded, fire welded, and weldless types in high carbon, low carbon, wrought iron or alloy analyses. Send coupon for literature.

STRENGTH MEANS EFFICIENCY in storing a wide variety of parts, when you use Republic Wedge-Lock Steel Shelving. Joints are designed to grow tighter as load increases, permitting higher stacking without distortion or instability. Result is efficient use of floor space plus easy rearrangement to meet changing conditions. Mail coupon below for additional information.

STEEL

and Steel Products

REPUBLIC STEEL CORPORATION
Dept. C-1383
3132 East 45th Street
Cleveland 27, Ohio

☐ Please have a Pig Iron Metallurgist call

Please send further information on:
☐ Chain Products ☐ Steel Shelving
☐ Materials Handling Equipment

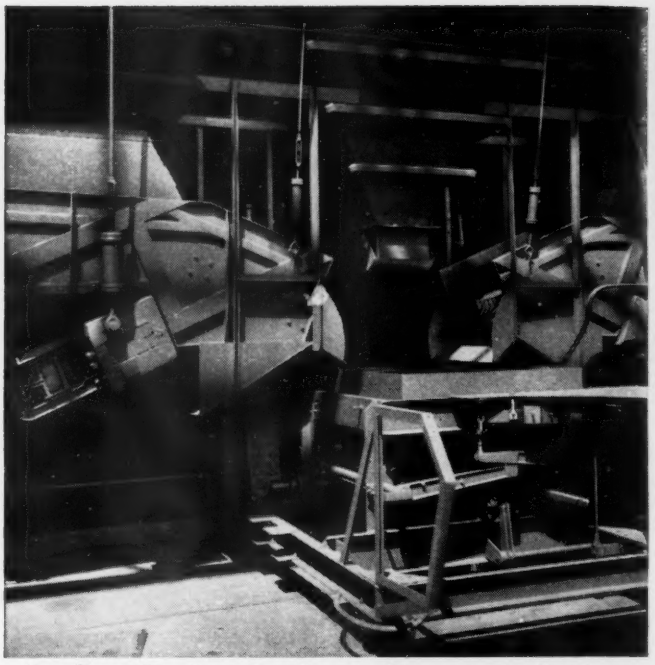
Name_____

Address_____

City_____ Zone____ State_____

Circle 588 on Inquiry Card—Page 219

JEFFREY puts VIBRATION to work in the foundry



Feeding—The flow of such materials as sand, coke, limestone, iron borings and castings is positively controlled by JEFFREY vibrating feeders. Rate of feed can be changed while a unit is running, and the response is instantaneous. No mechanical adjustments are required and power consumption is low. Units shown are vibrating feeders with grizzly sections, delivering coke and limestone from bin storage to a weigh car.

Conveying—JEFFREY mechanical vibrating conveyors are widely used for handling foundry sand and castings. Their gentle, but positive, conveying action does not tumble or degrade even fragile castings. Units are compact, sturdy and dustproof, with no wearing parts in contact with conveyed materials.

Cooling—Castings move slowly along this JEFFREY mechanical vibrating conveyor, which serves as a cooling means. Similar conveyors within the foundry carry small poured molds to the shakeout.

For a free copy of Catalog 845 describing foundry equipment, write to The Jeffrey Manufacturing Company, Columbus 16, Ohio.

JEFFREY

CONVEYING • PROCESSING • MINING EQUIPMENT
TRANSMISSION MACHINERY • CONTRACT MANUFACTURING

Circle 590 on Inquiry Card—Page 219

Circle 591 on Inquiry Card→

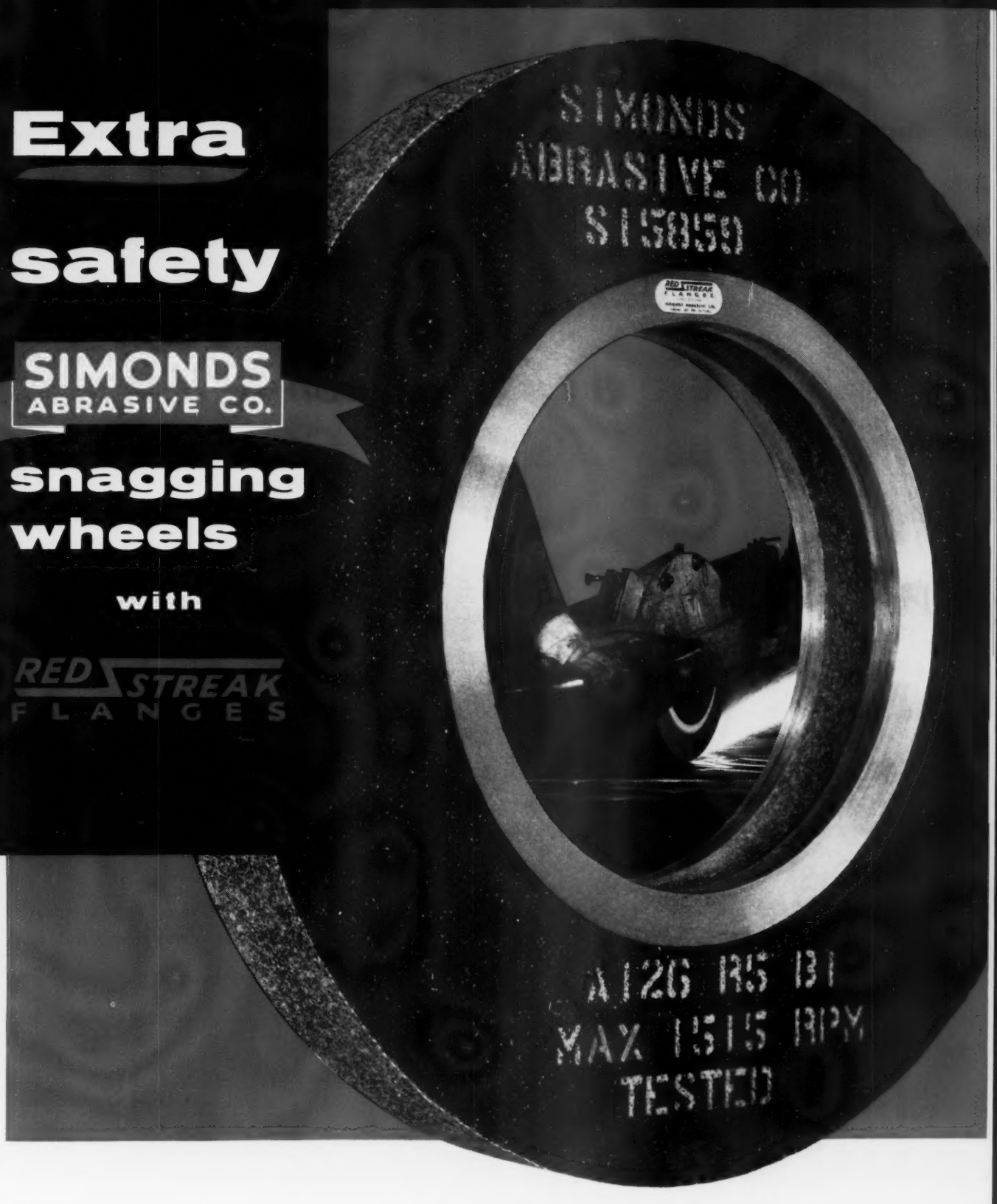
Extra safety

SIMONDS ABRASIVE CO.

snagging wheels

with

RED STREAK FLANGES



Strong, high-speed resinoid bonded wheels with built in circular steel flanges. Exceptional for fast stock removal, long wheel life and extra protection against radial cracking. Easy to mount. Accurate balance, true running for superior grinding action. In 6″, 10″ and 12″ hole sizes. Send for bulletin ESA—62.

SIMONDS ABRASIVE COMPANY • PHILADELPHIA 37, PA.

Branch Warehouses: Boston, Detroit, Chicago, Portland, San Francisco. Distributors in Principal Cities
Division of Simonds Saw and Steel Co., Fitchburg, Mass.

CALL YOUR SIMONDS DISTRIBUTOR

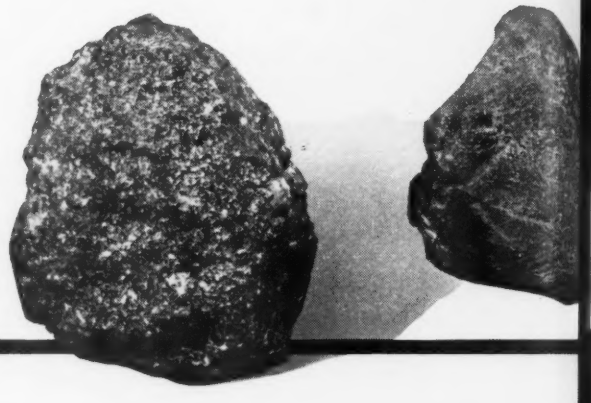
LOCAL STOCK FAST SERVICE

ANNOUNCING . . . the NEW

44 ALUNDUM* abrasive

. . . a revolutionary Norton development for new "TOUCH of GOLD" economy in foundry snagging

You Can SEE The Difference! The new Norton 44 ALUNDUM abrasive (at right) differs definitely in appearance from ordinary aluminum oxide abrasive. The finer grain structure of "44" indicates its much denser, tougher composition. And the money-saving performance of this modern new abrasive is just as easy to spot — every time 44 ALUNDUM wheels go to work for you.



In new 44 ALUNDUM abrasive Norton brings you a combination of grinding quality, versatility and economy never before equalled in a non-premium abrasive.

We want to emphasize that point. Although the new "44" is non-premium priced, right there its resemblance to any ordinary aluminum oxide abrasive ends abruptly. It is definitely different and better in every way.

"44" is made differently, by a special, Norton-developed electric furnace process that results in extreme toughness and ruggedness.

"44" performs differently. Compared to ordinary aluminum oxide abrasive wheels, the new 44 ALUNDUM wheels cut faster, grind cooler and last longer. They do more work per wheel. When snagging, these "Touch of Gold" advantages mean improved product quality, higher production rate and lower cleaning room costs.

"44" is job-proved. Over 1100 different tests were made on the new 44 ALUNDUM wheels, in plants of all kinds throughout the country. Here are some typical reports from foundries:

- ***"Wheel life doubled over previous standard wheels. Operators very pleased with rate of cut."***
- ***"80% longer wheel life and much faster cut."***
- ***"Faster cutting, better finish, much less depth of burn."***

Adding Up

"44" is a real work-horse abrasive that delivers thoroughbred performance. On any job for which you're now using non-premium priced aluminum oxide wheels, the new 44 ALUNDUM wheels will grind off more metal per dollar — faster, easier and better.

Your Norton Distributor will be glad to prove this to you. See him about arranging test runs of new 44 ALUNDUM wheels in your plant. Or write to the nearest district office of NORTON COMPANY, Worcester 6, Mass. Distributors in all industrial areas, listed under "Grinding Wheels" in your phone book, yellow pages. Behr-Manning Company, Troy, N. Y., division of Norton Company. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Massachusetts.

ON YOUR SWING FRAME GRINDERS new 44 ALUNDUM wheels add the "Touch of Gold" that speeds up snagging operations, reduces operator-fatigue and cuts costs. Made with the well known Norton B11 resinoid bond, they'll take the heaviest pressures and highest speeds — with fast, cool cutting action and extra long wheel life never before matched in non-premium priced wheel performance.

ON YOUR FLOOR STANDS you'll grind off more metal per wheel and per man-hour with new 44 ALUNDUM wheels. New "44" is the toughest, most efficient abrasive you can use for snagging.

ON YOUR PORTABLES new 44 ALUNDUM wheels "hug that work" closer, with least vibration and bounce. And "44" mounted wheels bring the same new, cost-cutting advantages to those hard-to-reach spots.

W-1741

NORTON
ABRASIVES

Making better products...
to make your products better

NORTON PRODUCTS: Abrasives • Grinding Wheels • Grinding Machines • Refractories

BEHR-MANNING PRODUCTS: Coated Abrasives • Sharpening Stones • Behr-cat Tapes

***Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries**

There's a world of difference in flasks!

FREMONT MAGNESIUM SPREADLOCK FLASKS

SAND CANNOT LODGE IN CORNERS

Long-life, easily replaceable, live rubber corner inserts completely close the corner gaps.

LONGER SERVICE

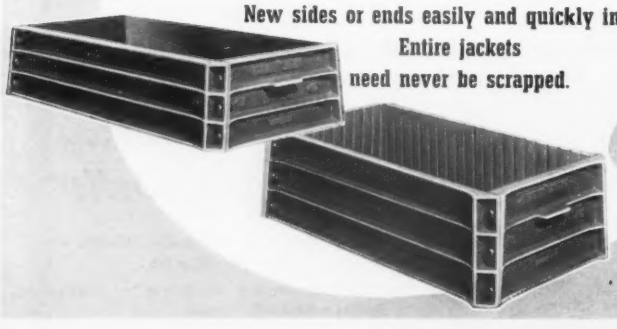
New two-piece male and female stop, inserted above and below the stud bolt, results in tremendous corner strength. Hardened forged steel cams.

LIGHTER, EASIER HANDLING

Write today for free literature and prices.

FREMONT CAST IRON OR CAST ALUMINUM JACKETS

New sides or ends easily and quickly inserted. Entire jackets need never be scrapped.



The Fremont FLASK Co.
FREMONT, OHIO

Circle 593 on Inquiry Card—Page 219

Circle 594 on Inquiry Card→

AT OUR WET AND DRY SAND RECLAMATION UNITS IN ACTION!

*Both Units at Work in Our Plant

NOW! You can see the amazing results (greater profit) that our NEW Air Reclaim, dry sand reclamation unit produces.

An easily operated Air Reclaim can be installed in *any* plant. Low head space provided by horizontal flow with centrifugal scrubbing (minimum breakage) produces the maximum quality/quantity of reclaimed sand by the MOST MODERN METHOD with simplified controls and extremely low cost maintenance.

Remember that we are foremost in SAND RECLAMATION.

Hydro-Blast fills the industry's needs for versatile, low cost, high production foundry equipment. Inquiries invited! A staff man will gladly furnish more details.

IT'S THE SPIN THAT DOES THE JOB!
FOUNDRY SAND
AIR-RECLAIM
RECLAMATION EQUIPMENT

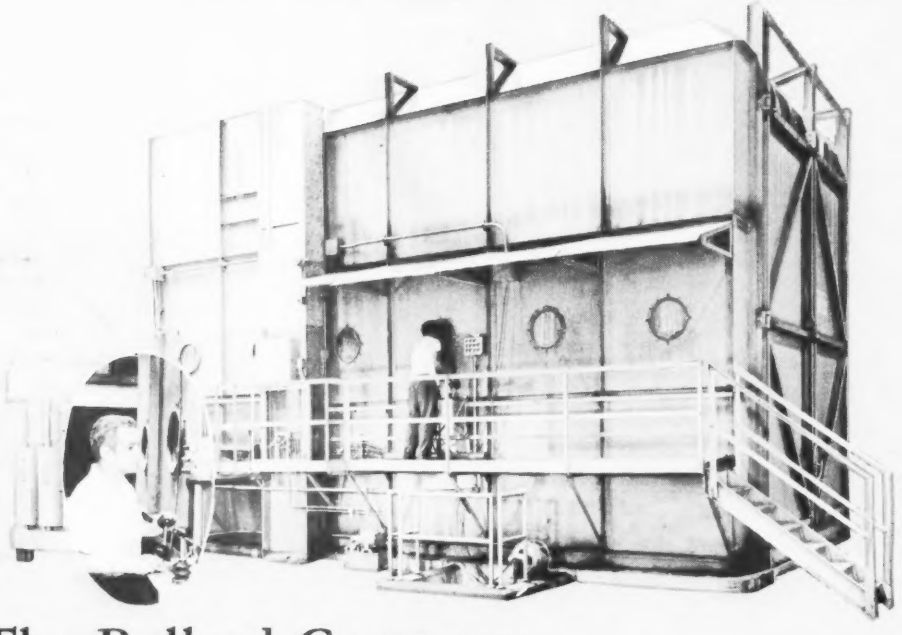
"Reclamation is our business ... NOT A SIDE LINE!"

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

HYDRO-BLAST 10265 FRANKLIN AVENUE
FRANKLIN PARK, ILLINOIS

Franklin Park Phone GLadstone 5-3212
Chicago Phone NAtional 2-5770

Among the Foremost . . .



The Bullard Company installs **HYDRO-BLAST** equipment

The Bullard Company, since 1880, has consistently built its reputation as a manufacturer of high quality machine tools — until today, it is one of the leaders in its field.

This progress was further expressed in the new foundry recently completed — one of the finest in the East — and we are justly proud that the Castings Cleaning System selected for this new foundry is HYDRO-BLAST.

If you contemplate modernization in your foundry, please call upon us. Hydro-Blast installations are international in scope. Companies of various sizes are consistently receiving the benefit of greater profits through the efficient performance and low maintenance cost of Hydro-Blast Equipment.

MEMBER FEMA FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC.

HYDRO-BLAST 10265 FRANKLIN AVENUE FRANKLIN PARK, ILLINOIS Franklin Park Phone GLadstone 5-3212 Chicago Phone NAtional 2-5770

How to cure 17 (CORE) headaches

...and produce better castings faster, for less money

HOW TO GET TOP PERFORMANCE
in core and facing sand formulas

Here is a rough guide to selection of core and facing sand binders to meet important handling, baking, storage and casting requirements. For expert help in developing the most effective formula, ASK THE MAN FROM CORN PRODUCTS.

FACTOR	RECOMMENDED BINDERS 1st choice	2nd choice	3rd choice
Green bond	Mogul	—	—
Dry bond	Kordek	Dextrine	Mogul
Green sand	Mogul	Dextrine	—
Dry sand	Kordek	—	—
Flowability	Dextrine	Kordek	Mogul
Collapsibility	Dextrine	Kordek	Mogul
Scratch hardness	Dextrine	Kordek	—
Reduced baking time	Mogul	Kordek	Dextrine
Better blowing	Mogul	—	—
Easy ramming	Mogul	—	—
Simplified, cleaner mixing	Kordek	Dextrine	Mogul
Easy shake-out	Mogul	Kordek	Dextrine
Smoother casting finish	Mogul	Kordek	Dextrine
Dry, easily handled	Mogul	Kordek	Dextrine
Less waste in handling	Mogul	Kordek	Dextrine
Better core paste	Kordek	—	—
Reduced costs	Mogul	Kordek	Dextrine

What are your five most important "targets" in core formulation and production? Would you say adequate green strength, minimum baking time, high bake strength, adequate hot strength, just-right surface hardness?

Whether or not you agree on these *five*, you will agree that a near-miss on any *one* of the *seventeen* vital points may well turn into a first class headache. That's why we say: Prevent or cure such headaches by checking your entire operation against all seventeen points on the table at left.

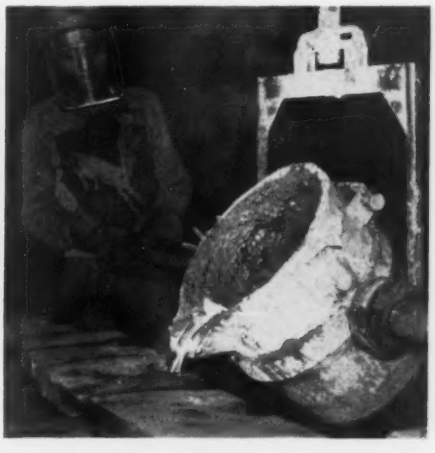
Okay on green strength, bake strength, surface hardness—but not so good on ramming, baking time, shake-out? Then here's what you do:

Ask the man from Corn Products! He'll help you work out a formula that may require only a minor adjustment—such as adding ¼% GLOBE Dextrine for better collapsibility, burn-out, etc. Or he may show how use of MOGUL or KORDEK as a major ingredient in your core or facing sand formula can cure your biggest headache!

The man from Corn Products has had years of experience on problems like yours. Call him in. Ask your local sales office, or write.

SIMPLIFIED, CLEANER MIXING is your first advantage in using such time-tested dry binders as Mogul, Kordek and Globe Dextrine.

EASY RAMMING is assured when you use Mogul cereal binder. You also step up quality and production of both cores and castings.



SMOOTHER CASTING FINISH, controlled collapsibility and easy shake-out also result from use of Mogul, Kordek and Globe Dextrine binders.

1906 • 50th ANNIVERSARY • 1956
CORN PRODUCTS REFINING COMPANY
17 Battery Place, New York 4, N. Y.

Makers of MOGUL® • KORDEK® • GLOBE® dextrine

Circle 595 on Inquiry Card—Page 219

ENGINEERS SERVING THE FOUNDRY INDUSTRY FOR MORE THAN 30 YEARS

Is AUTOMATION the Answer for Your Foundry?

For low cost, high volume foundry production—the answer *is* Automation. Whether your interest lies in ferrous or non-ferrous castings—shell molding or CO_2 process, steel or malleable, production or jobbing—Foundry Automation can be *your* solution to rising costs, improved casting quality, and greater output.

Foundry automation at Giffel's & Vallet is a highly developed science . . . one that has established new standards of production and quality control for the foundry industry. Giffels & Vallet planning and engineering is reflected in many automated foundry installations, both at home and abroad—ranging from such companies as Ford, U. S. Steel, Lynchburg, Fiat, Unitcast—to many smaller foundries equally interested in the benefits to be had from automatic operation.

G & V services are discussed in a special Foundry Brochure. A copy will be mailed on request.

INDUSTRIAL ENGINEERING DIVISION

Giffels & Vallet inc.

DETROIT 26, MICHIGAN New York, Chicago, Houston • Toronto and Windsor, Ont.

Plant Layout • Process Development • Automation Engineering • Materials Handling • Equipment Design • Building Design

this man uses radiography for product control

$80 a month
invested in equipment
SAVES him thousands
a year in needless rejects
...his customers are *happy*

this man doesn't

high reject rate
(correctable by radiography)
COSTS him thousands
a year in needless waste
...his customers *howl*

Makes no difference what you make or buy or sell...
if it needs "seeing into" for quality control, radiography (gamma or x-ray) can probably profit you, as it does others.

Talk it over with your local Picker representative *
or write us outlining your problem and, if possible, sending typical samples. We'll make tests and tell you frankly whether radiography holds any promise for you.

Picker x-ray

PICKER X-RAY CORPORATION
25 South Broadway, White Plains, N. Y.

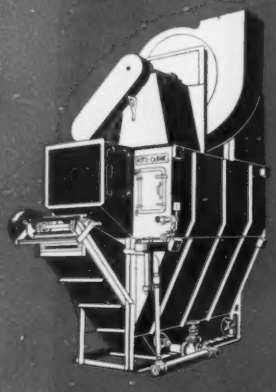
Costs you nothing to find out...
maybe it's costing you a great deal right now NOT TO.

**There's probably a Picker district office near you (see local 'phone book).*

Picker... your one Source for Everything in Radiography and Fluoroscopy

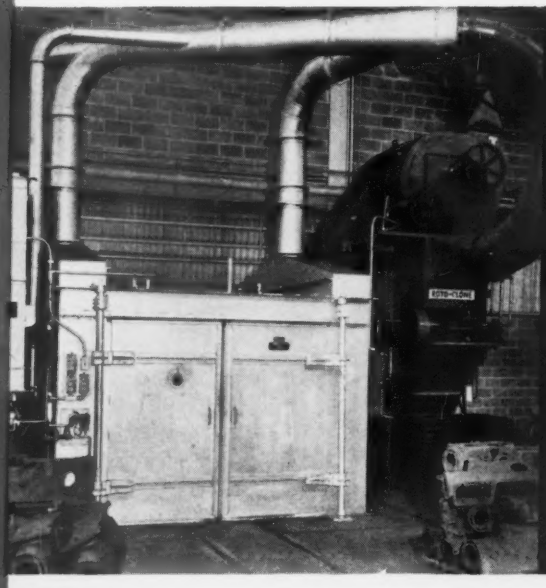
Better Air Is Our Business

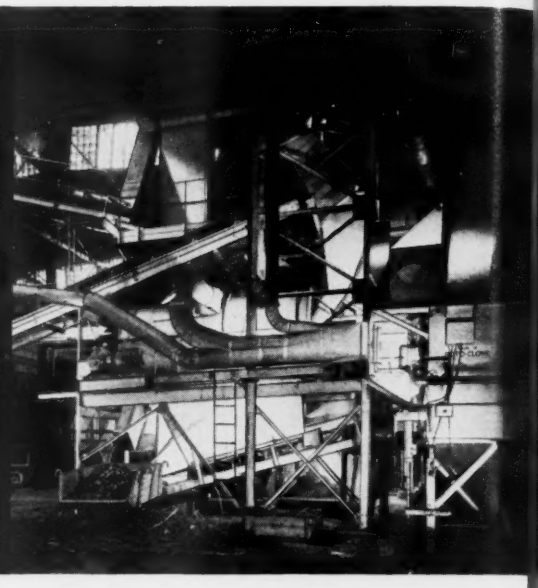
Type N ROTO-CLONE



ABRASIVE CLEANING, SAND HANDLING

The Type N ROTO-CLONE is widely used for exhausting both abrasive cleaning (below left) and sand handling operations. High cleaning efficiency of this hydrostatic precipitator results from the combined action of centrifugal force and the thorough intermixing of water and dust-laden air. Automatic sludge ejector provides for easy disposal of collected material. Bulletin 272.





AAF fights foundry d

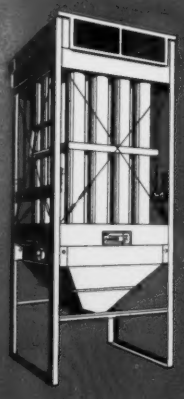
GRINDING

Type D ROTO-CLONE

The usual recommendation for snag, portable and swing frame grinding dust is the Type D ROTO-CLONE which combines exhauster and separator in a compact, self-contained unit. It draws in the dust-laden air, delivers the collected material to the storage hopper and expels the cleaned air —all in a single operation with only one moving part: the impeller. Bulletin 272.

High efficiency, low cost and small space requirements make AAF's Type W ROTO-CLONE a favorite for shakeout operations. Water sprays extend the effectiveness of the dynamic forces to the collection of the lightest and finest dust particles. Requires little maintenance, uses a minimum of water and maintains efficiency regardless of variation in air volume. Bulletin 274.

AMERjet

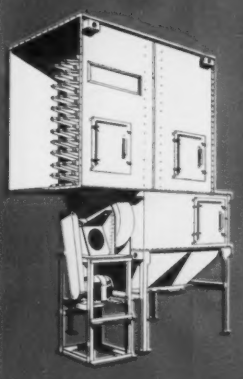


ELECTRIC MELTING FURNACE

The AMERjet Fabric Dust Arrester is recommended for metallic fumes from electric melting furnaces. Reverse jet principle allows velocities through the cleaning media up to 5 times greater than ordinary fabric collectors. Constant air volume is assured by constant, automatic and continuous reconditioning of cleaning tubes. Bulletin 279.

AAF's AMERclone dry centrifugal, originally designed for boiler fly ash, is the answer to cupola stack gases. Not a cinder-catcher, the AMERclone traps the fine particles that often settle on parking lots and surrounding neighborhoods. One AMERclone handles two cupolas alternately, assuring full-time utilization of equipment. Bulletin 291.

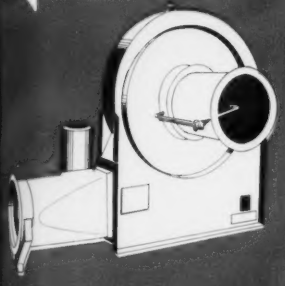
AMERclone



CUPOLA

dust on all fronts

SHAKEOUTS



Type W ROTO-CLONE

Where is process dust causing you trouble?

GRINDING? SHAKEOUTS?
ABRASIVE CLEANING? CUPOLAS?
SAND HANDLING? MELTING FURNACE?

Only a complete line of versatile dust control equipment can successfully fight the plant-wide battle against foundry dust. And the world's most complete line is AAF. It includes hydrostatic precipitators, dynamic precipitators, dry centrifugals and fabric arresters.

AAF's 20 years experience in foundry dust control assures the right unit for every dust-producing operation, regardless of type of dust or concentration. Every product in the line, what's more, offers the basic design features you expect from AAF:

- **Small space requirements**
- **Maintained performance over a wide range of operating conditions**
- **Constant exhaust volumes**
- **High collection efficiency**

Here they are—AAF's "stable of champions" for foundry dust control. One of them will answer *your* dust problem. For more information on any or all, call your local AAF representative or write direct.

AAF

herman nelson

American Air Filter — BETTER AIR IS OUR BUSINESS —

COMPANY, INC.

266 Central Avenue, Louisville 8, Kentucky
American Air Filter of Canada, Ltd., Montreal, P. Q.

Herman Nelson Portable Heaters

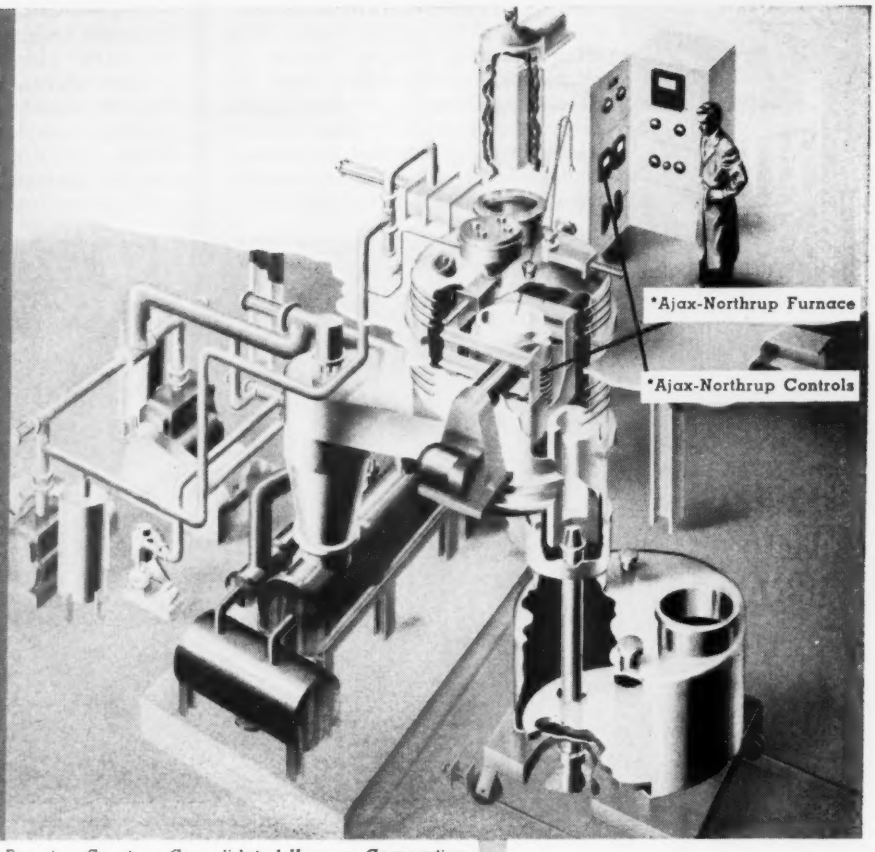
Illinois Steam Heating Specialties

AAF Electric Furnace Hoods

AAF Type K Exhauster

Circle 598 on Inquiry Card—Page 219

nothing new here but the vacuum



Drawing Courtesy Consolidated Vacuum Corporation

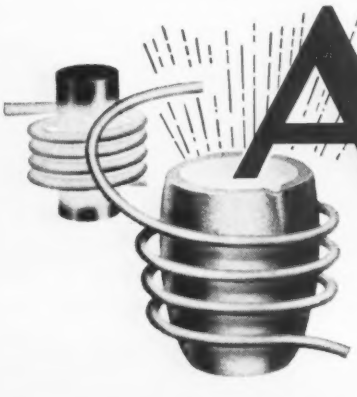
Take away the tank, a few special vacuum features and pumping equipment from this 1000 lb. capacity vacuum melting installation at the Carboloy Department of General Electric Company, and you have the same high quality AJAX-NORTHRUP furnace used for melting the finest alloys elsewhere at Carboloy and throughout the world. You can depend on AJAX-NORTHRUP furnaces for:

- *A clean melt with consistent analysis*
- *Fast, controlled melting*
- *Almost 100% recovery of scrap*
- *Amazing versatility*
- *No fumes, noise, or external heat*
- *Maximum economy and low maintenance*

*For details write AJAX ELECTROTHERMIC CORPORATION, TRENTON 5, N. J.

No induction vacuum melting installation can be any better than the high frequency induction furnace around which it is built. That's why more AJAX-NORTHRUP furnaces are used than any other for this important work.

Associated Companies: Ajax Electric Company—Ajax Electric Furnace Co.—Ajax Engineering Corp.



AJAX NORTHRUP SINCE 1916

AJAX

INDUCTION HEATING-MELTING

See Us At The Metal Show—Booth 1609

SCIENTIFICALLY DEVELOPED . . LABORATORY CONTROLLED FOUNDRY PRODUCTS

DELTA

FOR STEEL . . GRAY IRON
MALLEABLE AND NON-FERROUS

DELTA
SUPERKOAT
WASH

COVERS A GREATER
SURFACE AREA . . PRODUCES
SMOOTHER . . CLEANER
CASTINGS . . . *at lower cost!*

Delta Superkoat Wash is recommended for Steel, Gray Iron, Malleable and Non-Ferrous castings. It's easy to mix and apply uniformly to green or dry sand and baked surfaces by dipping, swabbing, spraying or brushing.

NOTE THESE IMPORTANT ADVANTAGES OF DELTA SUPERKOAT WASH:

1. **NO PRECIPITATION OR SETTLING —** When thoroughly mixed, wash will stay in suspension indefinitely.
2. **EASY TO APPLY —** It can be dipped, swabbed, brushed or sprayed on green or dry sand and baked surfaces.
3. **RAPID, DEEP PENETRATION AND EXCELLENT ADHESION** Quickly anchors itself 5 to 7 grains deep in sand surfaces.
4. **NON-REACTIVE — LOW GAS —** Will not react or produce gas in contact with molten metal.
5. **REDUCED CLEANING COSTS —** Cast surfaces are smoother and castings are cleaner.
6. **WILL NOT FLAKE —** When completely dried, the wash is thoroughly bonded to the sand surfaces.
7. **HIGHLY REFRACTORY —** Has an unusually high fusion point.
8. **ELIMINATES SAND FUSION AND BURN-IN —** Flowing metal will not crack or rupture wash during pouring.
9. **ECONOMICAL TO USE —** Covers a greater surface at a lower cost per pound of wash.

Working samples and complete literature on Delta Foundry Products will be sent to you on request for test purposes in your own foundry.

DELTA OIL PRODUCTS CO.
MANUFACTURERS OF SCIENTIFICALLY CONTROLLED FOUNDRY PRODUCTS

MILWAUKEE 9, WISCONSIN

Automatic MONORAIL

Delivers 25 Tons Daily

One man uses push-button control to load, automatically dispatch, over four tracks, and dump fresh core sand at any of 24 stations.

This flexible American Monorail System is tied in with manually operated track switches. Stations may be increased to 16 per track.

This American Monorail installation is typical of hundreds which have sharply cut handling costs.

Today call your nearby American Monorail Representative or write us.

Member of Materials Handling Institute • MonoRail Association

AMERICAN OVERHEAD HANDLING EQUIPMENT

MONORAIL COMPANY

13104 ATHENS AVENUE
CLEVELAND 7, OHIO

[IN CANADA—CANADIAN MONORAIL CO., LTD., GALT, ONT.]

Circle 601 on Inquiry Card—Page 219

Foundrymen who know their business say:

Famous CORNELL CUPOLA FLUX

gives you cleaner iron

All of our good customers have high praise for Famous Cornell Flux. They like the way it purges molten iron of impurities, reduces sulphur and in general helps to produce superior castings.

For the name of a satisfied user, just ask us! We'll only be too happy to oblige!

FAMOUS CORNELL BRASS FLUX

Famous Cornell Brass Flux makes metal pure and clean. It plays an important role in the production of high grade, bright finish aluminum or brass castings. Use more scrap without danger of dirt, porous or spongy spots due to dirty metal. Thinner, yet stronger sections can be poured and the Cornell exclusive formula greatly prevents obnoxious gases. *Write for Bulletin* 46-*A*.

FAMOUS CORNELL ALUMINUM FLUX

Famous Cornell Aluminum Flux cleans molten aluminum for tough, clean castings even when the dirtiest scrap is used. Forms a perfect covering over the metal during the melting process preventing oxidation and the gases, to a great extent, that form during the melting.

Write for Bulletin 46-*A*

The CLEVELAND FLUX Company

1026-40 MAIN AVENUE, N. W. • CLEVELAND 13, OHIO

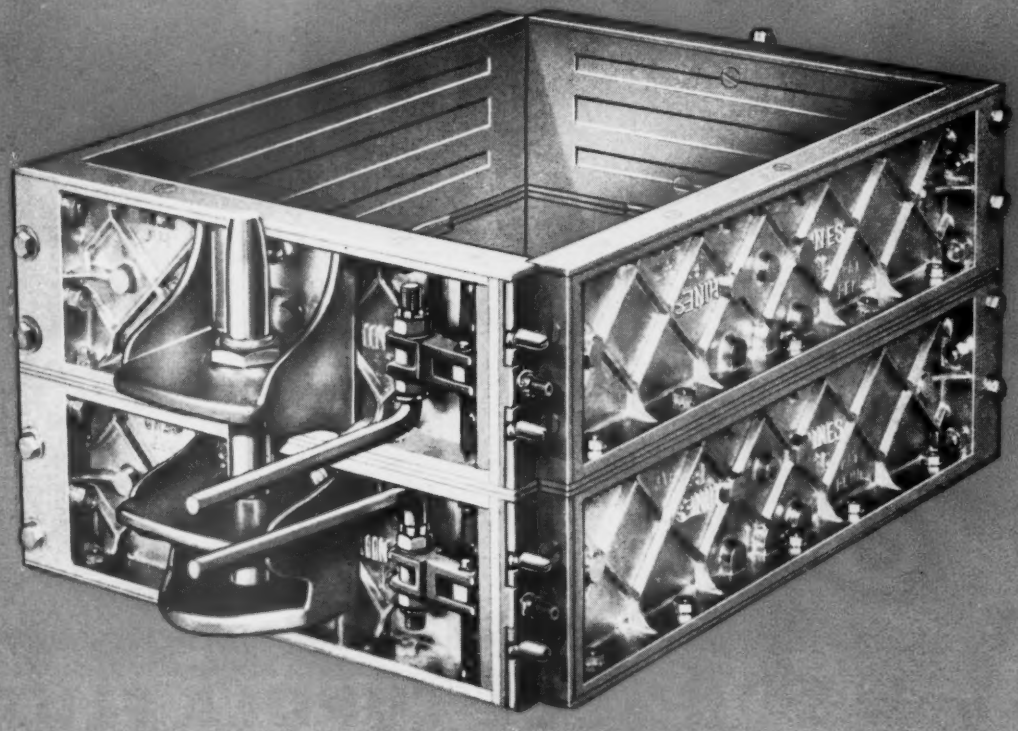
Manufacturers of Iron, Semi-Steel, Malleable, Brass, Bronze, Aluminum and Ladle Fluxes—Since 1918

FAMOUS CORNELL FLUXES

Trade Mark Registered

HINES

announces ITS NEW

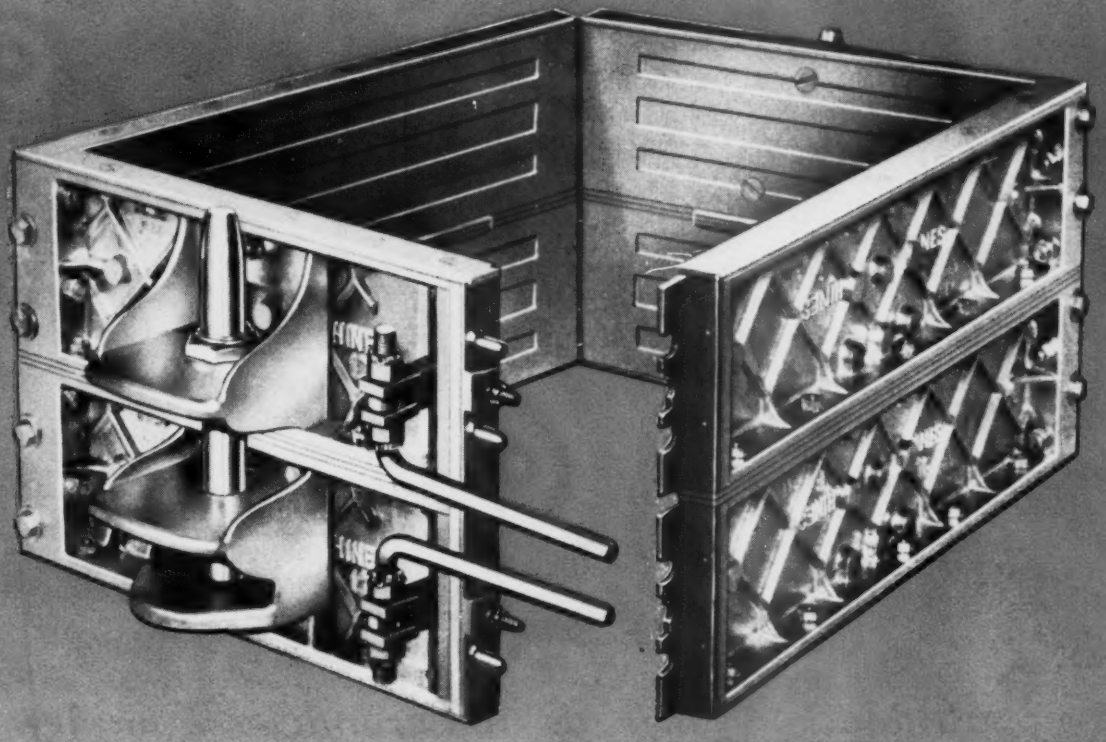


PATENTS PENDING

This new, straight-wall, Hines "HINGE-OFF" flask is recommended for hand and mechanical molding of loose, match plate and cope and drag plate patterns, up to 20″ in length. Made of light weight metal, it maintains alignment because it will not warp from absorbing moisture and drying, as in wood flasks. No wood screws to work loose! Accurate pins and guides and pin center alignment! And, it is provided with a positive, fast-acting, locking mechanism that aligns and locks the open end perfectly and rigidly, to prevent shift!

Maintenance is economical — flask can be repaired and kept in alignment at your own plant. Only one adjustment — tightening the nuts on the locking mechanism. Lengths and widths, 10″ to 20″, in even inches. Cope and drag depths, 3″ to 5½″, in half-inches. Depths over 5½″ are made up in sections. Equipped with Hines standard pins, bushings or guides.

HINGE-OFF FLASK



PATENTS PENDING

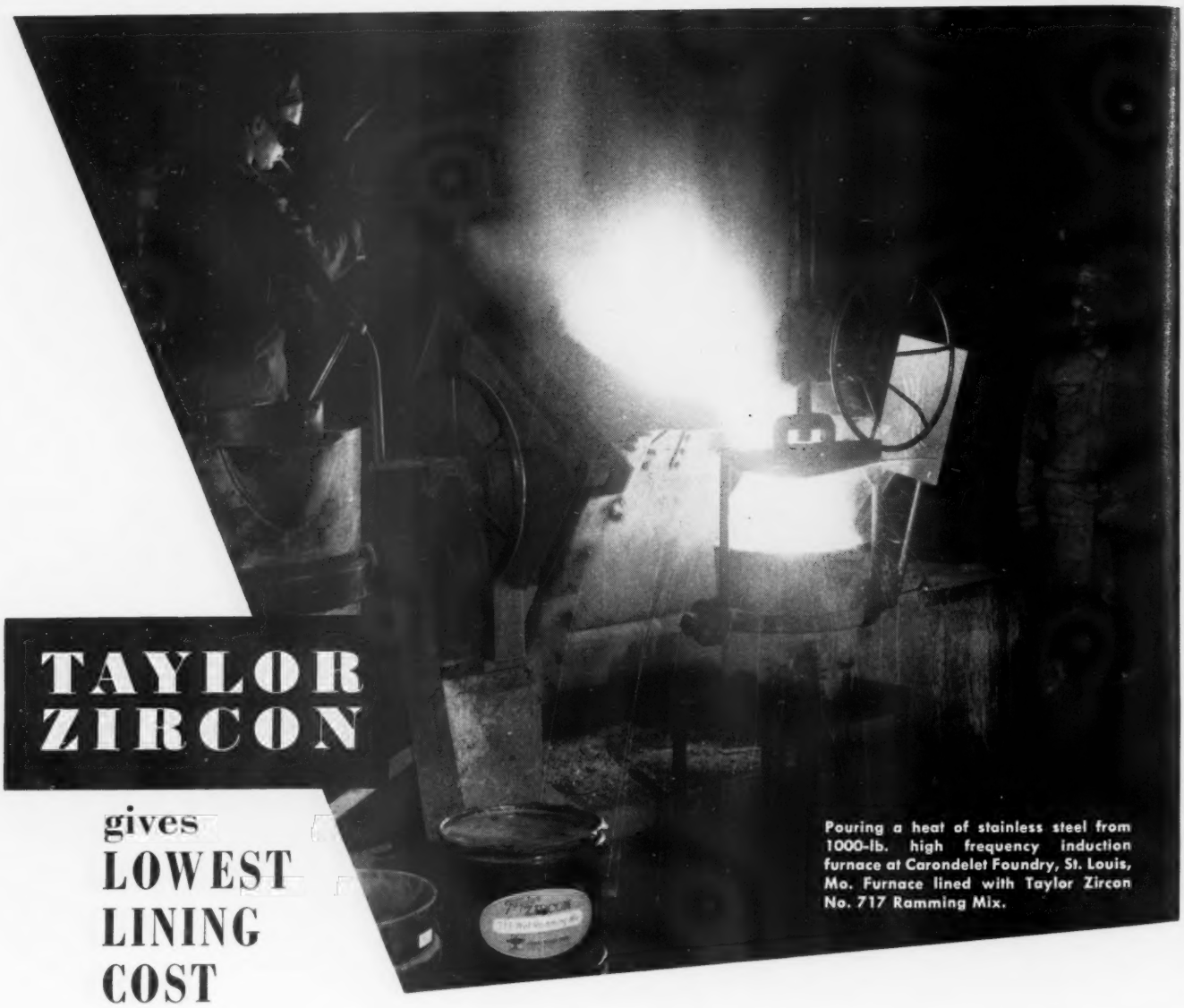
This new "HINGE-OFF" flask is being used in our newly developed STACK OR MULTIPLE MOLDING METHOD (Patents Pending). Contact our Main Office for working arrangements and prices.

FOUNDRY EQUIPMENT MEMBER FEMA MANUFACTURERS ASSOCIATION INC.

THE HINES FLASK CO.

3431 WEST 140th STREET • CLEVELAND 11, OHIO

Circle 603 on Inquiry Card—Page 219



Pouring a heat of stainless steel from 1000-lb. high frequency induction furnace at Carondelet Foundry, St. Louis, Mo. Furnace lined with Taylor Zircon No. 717 Ramming Mix.

TAYLOR ZIRCON gives LOWEST LINING COST

for induction furnaces at Carondelet Foundry

Careful cost accounting at Carondelet Foundry, St. Louis, Mo., has shown Taylor Zircon No. 717 Ramming Mix to be the lowest cost lining for their two 1000-lb. high frequency induction melting furnaces . . . *less than ⅓ the cost* of previous lining materials used, as shown by their cost records, reproduced at left.

TYPE OF LINING	Magnesia-alumina-spinel	Taylor Zircon No. 717 Ramming Mix
Representative No. of Heats	56 62	306 342
Total Lbs. of Metal Melted	42,796 47,835	304,837 310,130
Average Lining Cost per pound of Metal	$0.00755	$0.00220

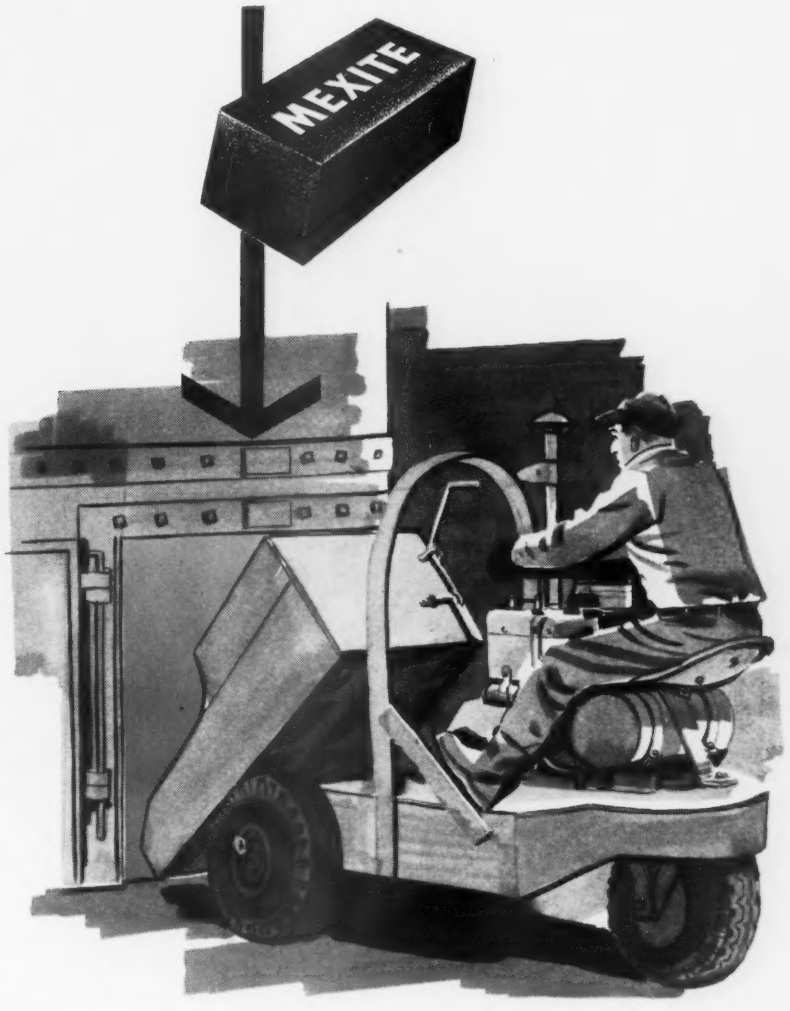
This foundry melts a wide variety of steels, principally nickel-chromium and straight chromium stainless. Pouring temperature is 3300° F. In addition to the cost advantage, Carondelet finds there is less slag build-up with Taylor Zircon and the lining is readily cleaned.

If your foundry melts similar stainless steel alloys, it will pay you to test Taylor Zircon linings. Write us, or contact the Taylor field engineer in your area for detailed information.

Exclusive Agents in Canada:
REFRACTORIES ENGINEERING AND SUPPLIES, LTD.
Hamilton and Montreal

The CHAS. TAYLOR SONS Co.
A SUBSIDIARY OF NATIONAL LEAD COMPANY
REG. U.S. PAT. OFF.
REFRACTORIES SINCE 1864 • CINCINNATI • OHIO • U.S.A.

the same results at lower cost with— MEXITE®



Mexite briquettes, composed of 70% graphitic carbon, provide foundrymen with a positive method of raising and stabilizing the carbon content of cupola charges and at the same time reduce the cost. Larger amounts of scrap can be used with resultant savings in charging costs. For example, if 400 lbs. additional scrap is charged, four Mexite briquettes will retain the same carbon analysis at a savings of $2.43* per ton of charge.

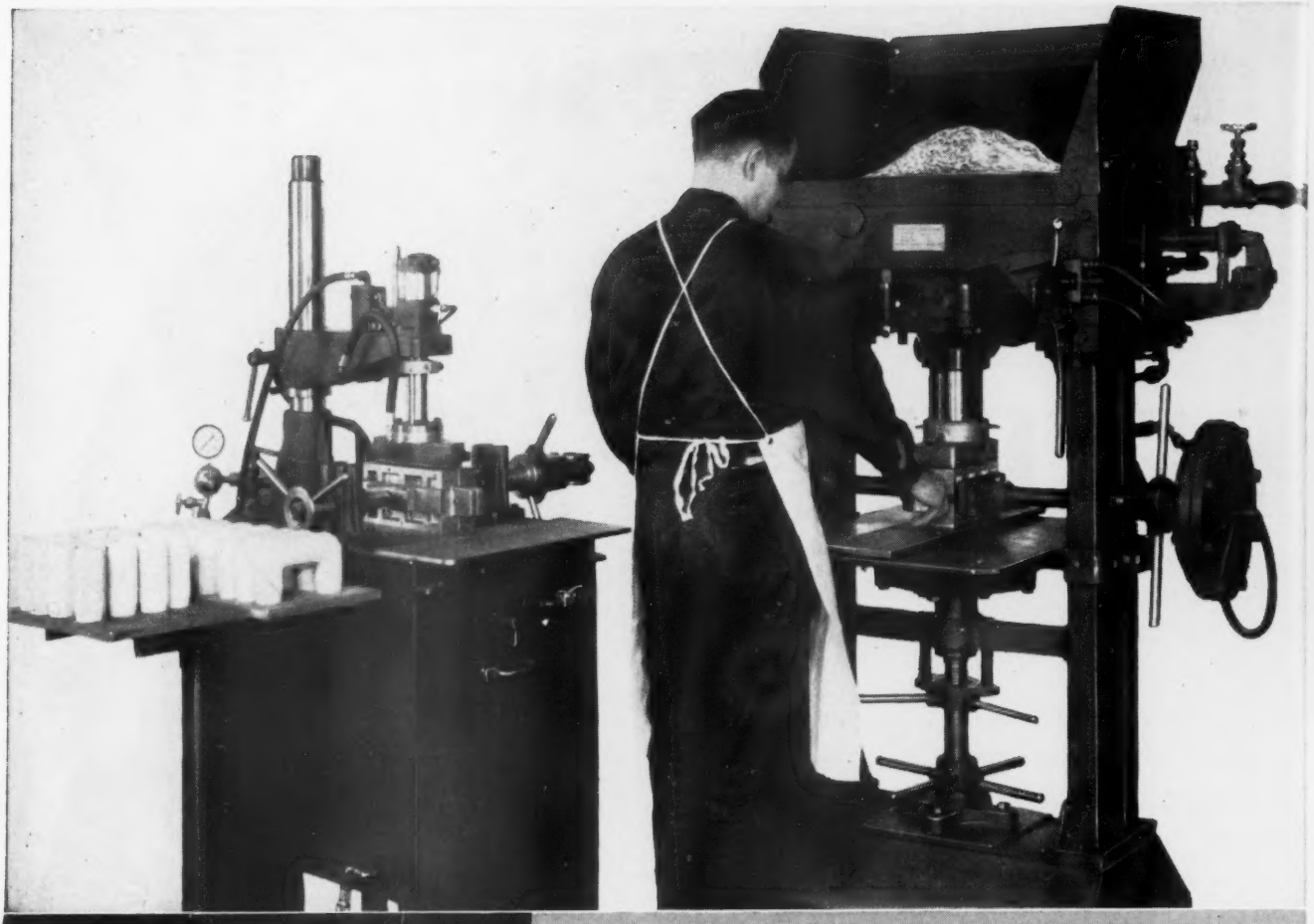
Mexite briquettes help produce better castings because they permit accurate carbon control. Mexite helps assure lower chill and hardness, and provides better fluidity and machinability thus increasing useable metal yield and cutting scrap loss. Mexite briquettes are packed 90 lbs. to a carton for easy handling and storing. We'd like to show you what Mexite can do in your foundry . . . write us today for a specific recommendation made for your particular area. We'll also send along our newest bulletin that will show you how Mexite can help keep your costs down where you want them to be.

** Based on average current pig iron and scrap prices*

188-A

THE UNITED STATES GRAPHITE COMPANY

DIVISION OF THE WICKES CORPORATION • SAGINAW, MICHIGAN



Redford

NO. 4 CORE BLOWER with AUTOMATIC CO_2 CORE HARDENING STATION

The *right tools* to assure uninterrupted production if you make cores by the CO_2 Process.

One core box is being blown while another one is automatically clamped, the cores hardened in the core box and the core box released ready to remove finished cores. If core boxes are suitable, cores can be mechanically stripped as shown in the picture at the right.

The Core Hardening Station is completely air operated. Automatic time cycle is quickly adjusted to meet job requirements.

Whether you blow cores with conventional sand mixtures or use the new CO_2 Process, REDFORD equipment gives you the *best* in over-all performance.

Redford IRON & EQUIPMENT CO.
20733 Glendale • Detroit 23, Michigan
Phone: KEnwood 1-8611

. . . loading is smooth and there's a scooping action with tip-back bucket.

. . . mobile ramp is pulled from bin to bin by the Tracto-Loader.

SAVES 21 MAN-HOURS UNLOADING BOXCAR

with compact TRACTOMOTIVE TL-6 TRACTO-LOADER— a high producer in confined areas

A boxcar of bulk materials is now unloaded in two to three hours with a TL-6 Tracto-Loader at Cambridge Tile Manufacturing Co., Cincinnati, Ohio — manufacturer and national distributor of Suntile, a fine clay tile for homes and industrial buildings. This includes the time it takes to spot a mobile ramp and set up a portable belt conveyor and hopper. The former hand labor method took 24 man-hours to empty a car!

The mobile ramp is pulled from bin to bin by the Tracto-Loader . . . then this compact, half-yard machine drives up the ramp and makes a right angle turn over a bridge into a boxcar. Its short, 6½-foot turning radius enables it to scoot around easily in the car. There's no time-consuming gear shifting, either — a pull or push on a single lever changes direction of loader.

The TL-6 gets big loads and delivers 'em to hopper fast. Instead of ramming to get load, operator lets the hydraulic torque converter do the crowding. It's smooth and positive . . . and there is a scooping action with the tip-back bucket. The full load is tucked in close to the cowl with the 50-degree tip back of bucket and carried low — means greater stability, better visibility, easier maneuvering.

See how the TL-6 can speed up the handling of bulk materials in your plant — even in the most confined areas. Arrange with your Allis-Chalmers Construction Machinery Dealer for a demonstration.

SOLD AND SERVICED BY YOUR ALLIS-CHALMERS CONSTRUCTION MACHINERY DEALER

Send For Free Descriptive Catalog On The Complete Line Of Tracto-Loaders ▶

TRACTOMOTIVE

TRACTOMOTIVE CORPORATION • DEERFIELD, ILLINOIS

Circle 607 on Inquiry Card—Page 219

TRACTOMOTIVE CORPORATION, Dept. F
Deerfield, Illinois

☐ Please arrange a demonstration of the TL-6
☐ Send catalog on Tracto-Loaders

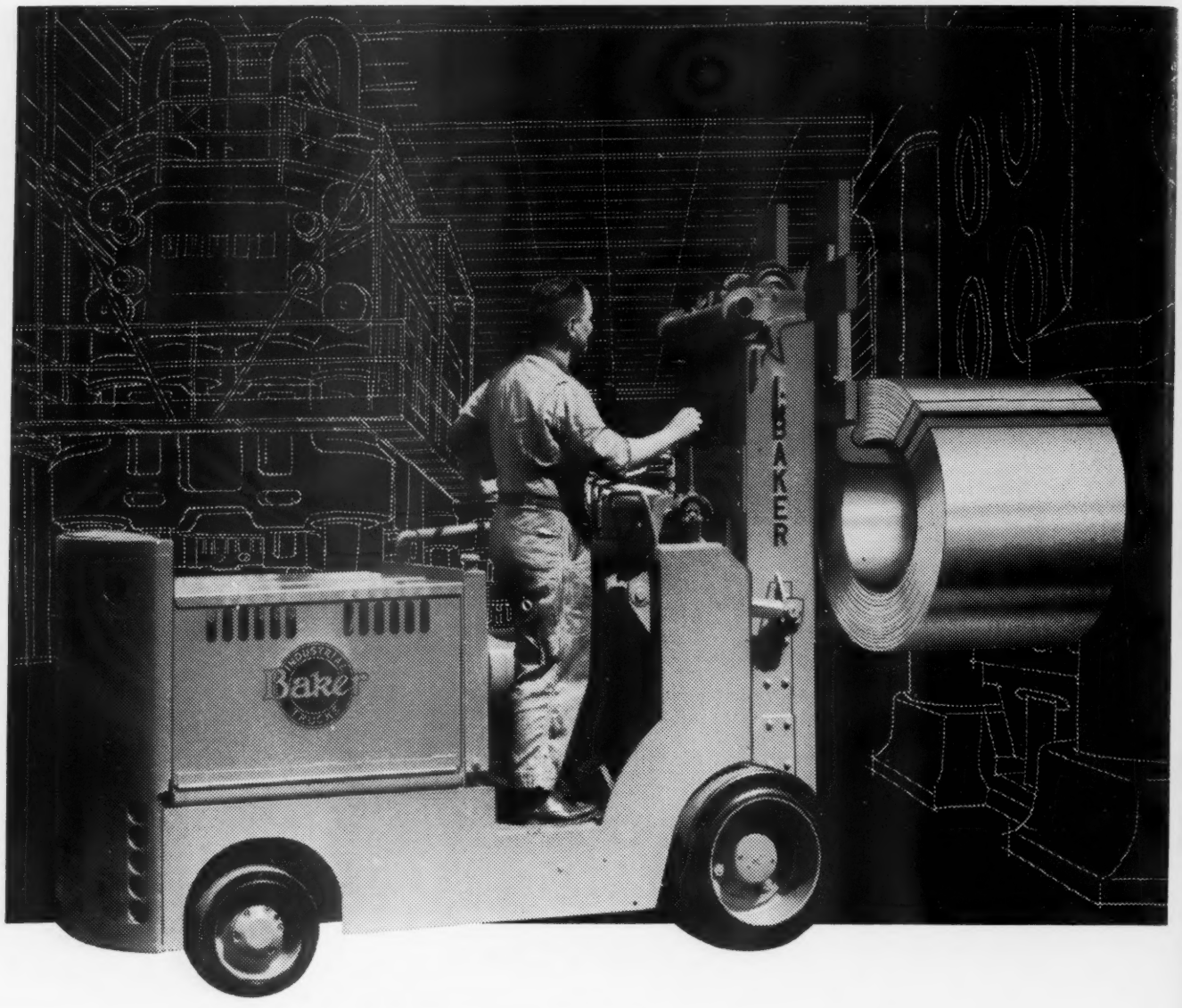
Name .....

Title .....

Company .....

Address .....

City ..... State .....



BAKER "JOM"—a BIG truck for efficient handling of BIG loads up to 10,000 pounds

Here is a rugged, heavy-duty fork or ram truck designed specifically for dependable handling of big, heavy loads. Capacities 7000, 8000 and 10,000 pounds.

Travel motor designed and built by Baker for grueling heavy service has high overload capacity. Five forward and reverse speeds. Foolproof electric interlock makes it impossible to start in high . . . assures smooth starts, protects motor, truck, and load. Automatic power shut-off and braking provides added safety when operator leaves his position.

Power steering makes the JOM easy to operate, reduces operator fatigue, means more work. Easily manipulated levers are conveniently located for greatest safety and most efficient operation. Low-cut design of the JOM gives the operator complete all-around vision of the load and road at all times.

Frame is of heavy gauge steel welded into a rigid one-piece assembly. Bumper counterweight is integral part of the frame for extra strength and stability.

Service time and costs are further reduced because all components are easily accessible . . . not hidden or covered by the frame. Write for Bulletin 1328.

Baker
handling equipment

THE BAKER-RAULANG COMPANY

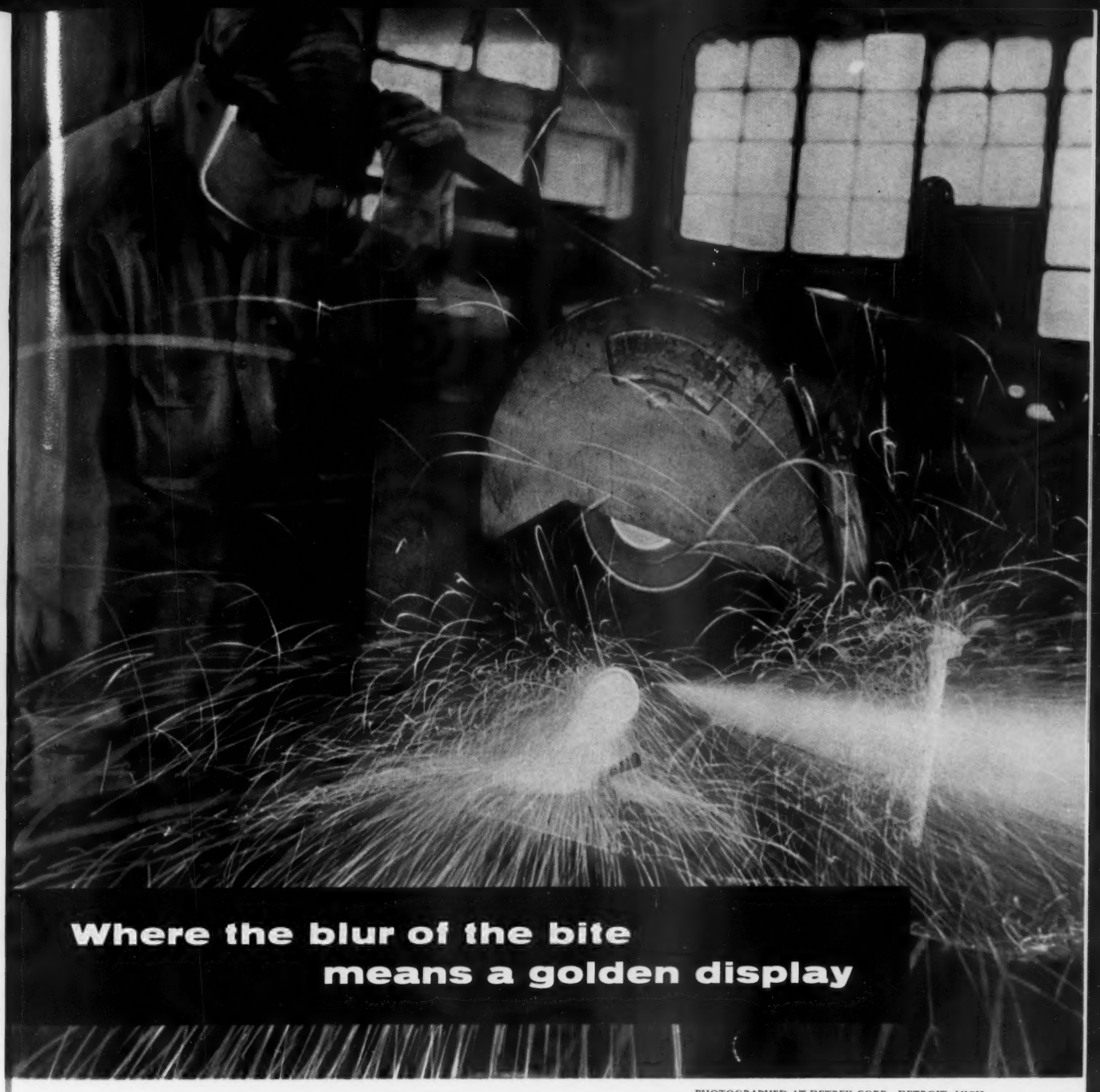
1223 WEST 80th STREET • CLEVELAND 2, OHIO

A subsidiary of Otis Elevator Company

6E-3

Circle 608 on Inquiry Card—Page 219

Circle 609 on Inquiry Card→



Where the blur of the bite means a golden display

PHOTOGRAPHED AT DETREX CORP., DETROIT, MICH.

The shower of sparks tells you right away this wheel cuts faster! But that's only *one* feature of the revolutionary new B7 Bond Resinoid Cut-Off Wheel developed by CARBORUNDUM. *Want a faster cut, free from burr and burn?* B7, tested against ordinary wheels, gives it to you...with equal wheel life. *Want up to 25% longer wheel life?* B7 gives it to you...with equal quality of finish. No wonder B7 Bond Wheels are setting new standards of performance for abrasive cut-off... in production, close tolerance accuracy, economy! Have your CARBORUNDUM Distributor or salesman put a B7 blade on your chopper type machine, and see for yourself! For Bulletin A-1374 on B7 Bond Wheels, write The Carborundum Company, Niagara Falls, New York. In Canada: Canadian Carborundum Company, Ltd., Niagara Falls, Ontario.

Through application "know-how" and product quality

CARBORUNDUM

REGISTERED TRADE MARK

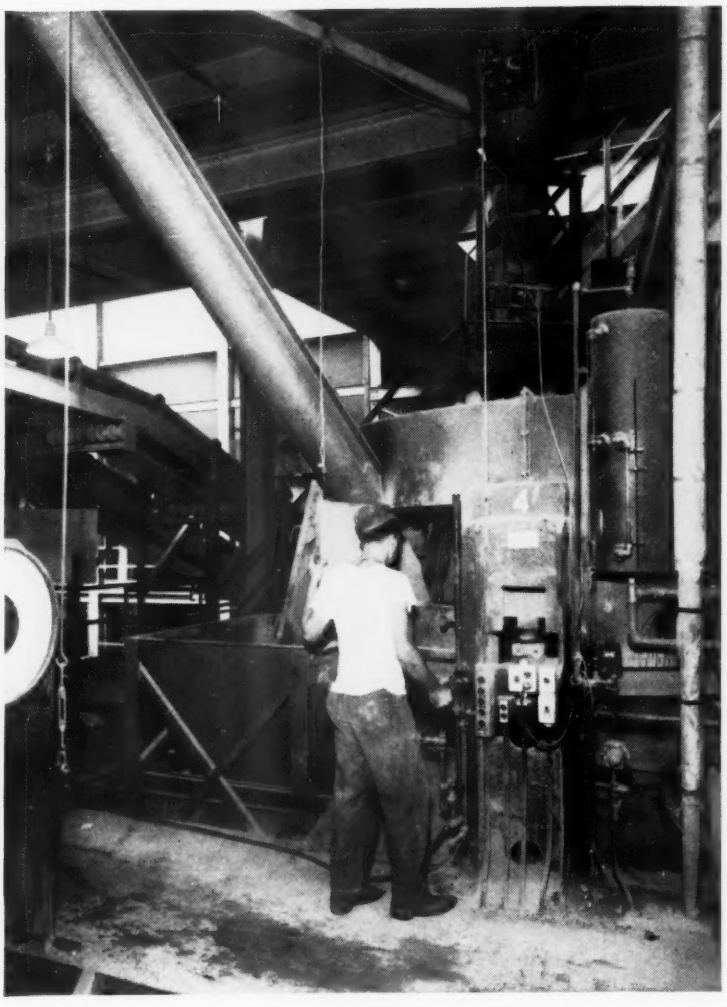
continually puts more sense in your abrasive dollar

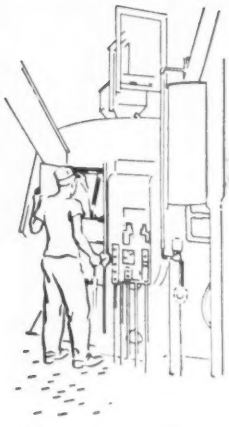
Prepare your sand *AUTOMATICALLY*

with a

Clearfield

mixer





Fast thorough
sand preparation

Complete uniformity in sand preparation is assured by using a Clearfield Mixer with Automatic controls. The operation of any Clearfield Mixer may be made partly or completely automatic by the use of electric time control apparatus. Length of tempering period, quantity of bond and moisture additions are predetermined, substituting individual judgment. The controls may be easily changed to produce any type of sand desired.

For the best in economical, efficient mixing equipment, write for our Catalog No. 83.

CLEARFIELD MACHINE COMPANY

Clearfield, Pennsylvania, U. S. A.

Circle 610 on Inquiry Card—Page 219

What about labor costs for FLASK BUSHING REPLACEMENT?

If you could buy pins and bushings that would hold their accuracy for more hours of rough flask handling—wouldn't it mean a substantial labor saving? Especially if you paid no more for the longer wearing bushing?

We know well how much an accurate, long wearing bushing means to good flask performance. And we assure highest quality in every manufacturing operation, from the selection of the proper steel to the final precision grinding.

Send for our latest catalog which lists the wide range of styles and sizes kept in stock for immediate shipment. We also produce many special pins and bushings which are stocked for the individual users.

Foundrymen know they can depend on Shanafelt for "Everything in Flask Pins and Bushings" as wells as "Everything in Steel Flasks."

Established 1893

THE SHANAFELT MANUFACTURING CO.

2600-2700 WINFIELD WAY N. E. CANTON, OHIO

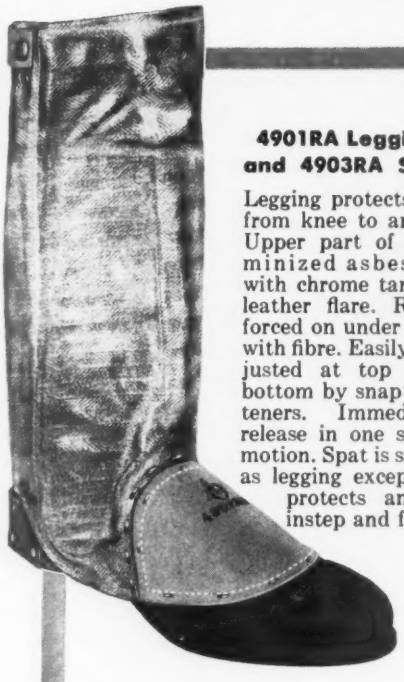
Foot and Leg Protection

For Foundry Feet
"Running a Temperature"

AO Aluminized Spats and Leggings!

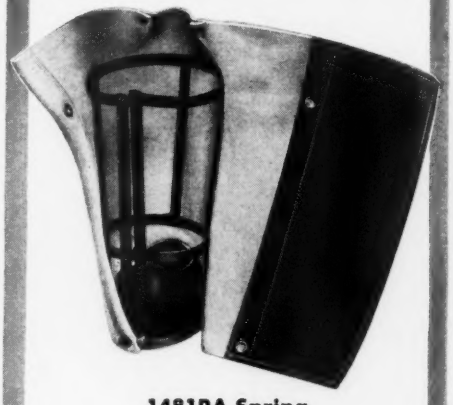
Reflect 90% of Radiant Heat

Here's the foot protection you want for cupola and ladle pouring . . . open hearth, blast furnace and electric furnace tapping and other exposures to high heat. Your workers get greatest comfort *2 ways* with AO Aluminized Asbestos: (1) 90% of the heat is reflected (2) Garment weight is reduced 50%. You are sure to find the exact spat and legging you want in AO's wide line. Your nearest Safety Products Representative can supply you.



4901RA Legging and 4903RA Spat

Legging protects leg from knee to ankle. Upper part of aluminized asbestos with chrome tanned leather flare. Reinforced on under side with fibre. Easily adjusted at top and bottom by snap fasteners. Immediate release in one swift motion. Spat is same as legging except it protects ankle, instep and foot.



1481RA Spring Type Legging

Very popular because no adjustments are necessary. Easy on, easy off! Spring steel frame not only helps protect leg from impact but creates air space between leg and legging. Has chrome tanned leather flare with spring clip.

7X160RA Legging and 7X161RA Spat

Legging is preferred by many because of unusual design and features. Has spring clip on chrome tanned flare. 3 positions at top and 2 at ankle for steel stay permit snug fit and quick release. Upper part of aluminized asbestos. Spat is same as legging except it protects ankle, instep and foot.

1481RAR Renewable Spring Type Legging

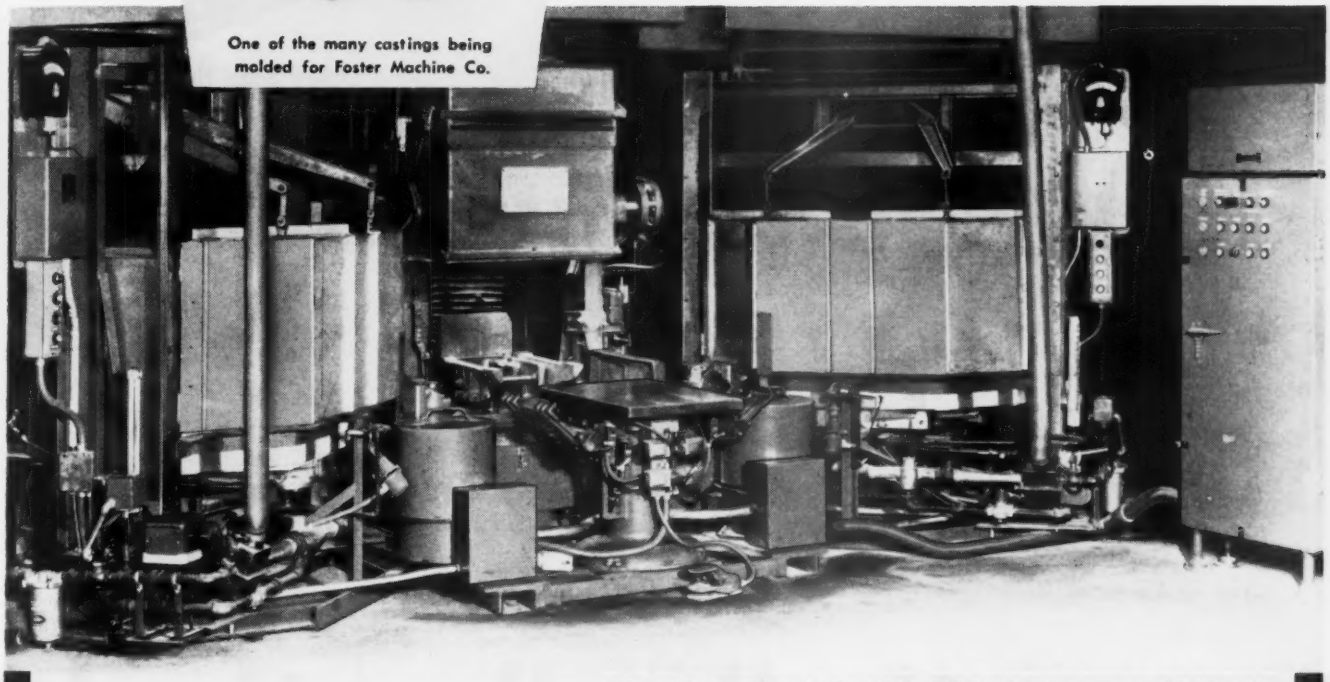
Same as 1481RA Legging except parts are replaceable. Covering (attached to frame by snap fasteners) can be removed and replaced. If damaged, either frame or covering can be ordered separately.

American Optical
SAFETY PRODUCTS DIVISION

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES

SHELL MOLDING *pays off* FOR FOUNDRY AND CONSUMER

One of the many castings being molded for Foster Machine Co.



Chicopee Twin produces shell molds for Roll Stand Castings at rate of 1600 per day

Casting buyer E. J. Tarala, Head of Production Planning and Scheduling, Foster Machine Co., Westfield, Mass., manufacturers of textile winding machinery — reports immediate savings on first lot of roll stand castings — snagging, grinding, machining operations completely eliminated. Also, paint adheres better and plating is easier because of smoother finish.

Production Pattern & Foundry Co., Chicopee, Mass., one of the country's leading shell molding foundries and producers of this casting, uses Shell Process equipment exclusively in their shell molding operation and reports that the consistent high quality shell molds produced on this equipment speeds production and saves money.

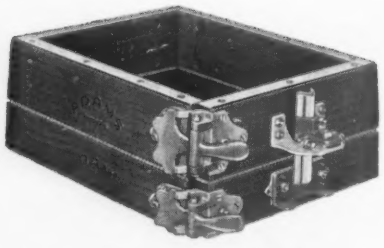
WRITE TODAY
for complete information on the Chicopee Twin and other allied foundry equipment.

SHELL PROCESS, INC.

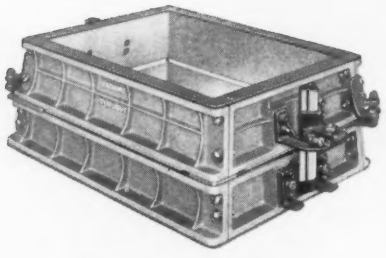
Manufacturers of Shell Molding Machines and Allied Equipment

364 Bliss Street • West Springfield, Mass.

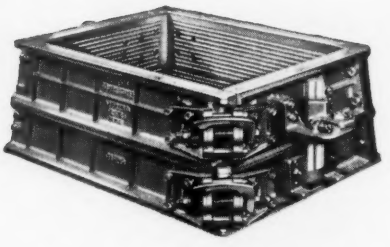
ADAMS . . . . .



Aluminum Easy-Off Flask

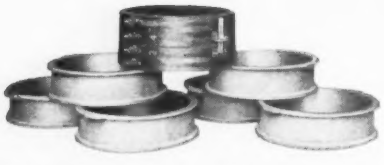


Aluminum Slip Flask

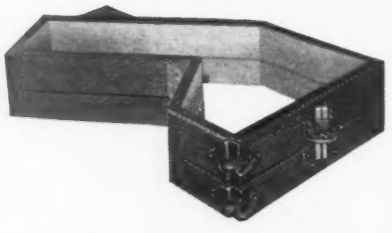


Cherry Snap Flask, tapered

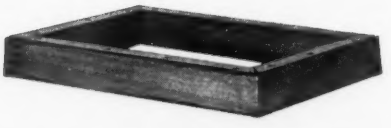
Flask Equipment to meet



Cherry Snap Flask, Round with Cast Iron or Aluminum Jackets

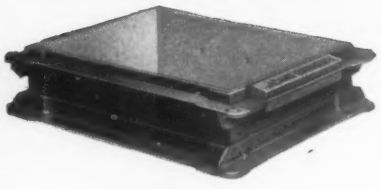


Cherry Snap Flask, Special Shape

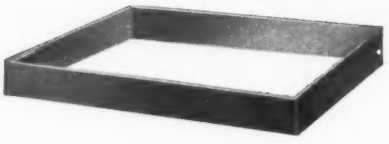


Chery Upset

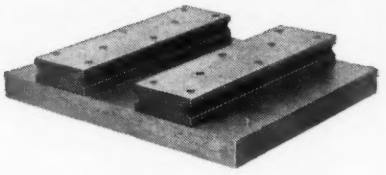
in practically all methods



Steel Jacket



Steel Band



Cherry Presser Board

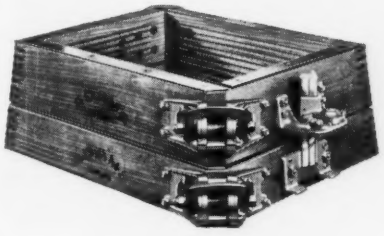
THE MOST COMPLETE LINE OF FLASK EQUIPMENT

Let Adams help you analyze your flask equipment problems. Write today for further information.

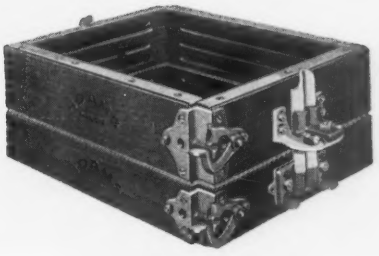
Pin and ear arrangement available to interchange with present Pattern Plate guides.

Handles and trunnions are available where required.

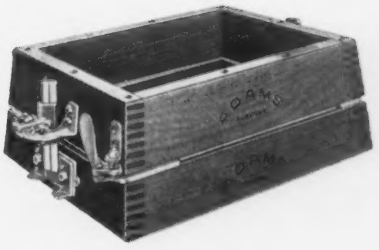
Manufacturers of



Cerry Snap Flask, straight

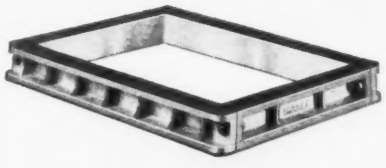


Cherry Easy-Off Flask

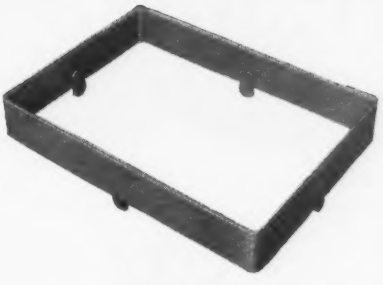


Cherry Slip Flask

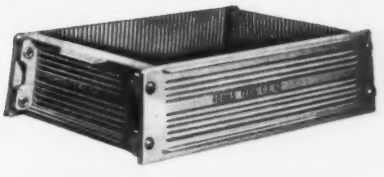
your requirements



Aluminum Upset

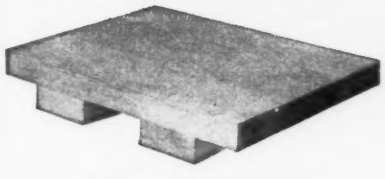


Steel Upset

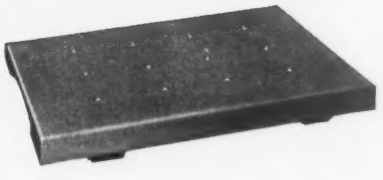


Cast Iron or Aluminum Jacket

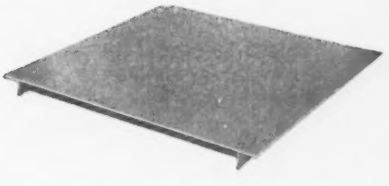
# of production.



Wood Bottom Board



No. 1 Steel Bottom Plate



No. 2 Steel Bottom Plate

The ADAMS Company

ESTABLISHED 1883

MOLDING MACHINES and FLASK EQUIPMENT

700 FOSTER STREET, DUBUQUE, IOWA, U.S.A.

Circle 614 on Inquiry Card—Page 219

NOW IS THE TIME TO LOOK OVER YOUR EQUIPMENT . . . and COMPARE!

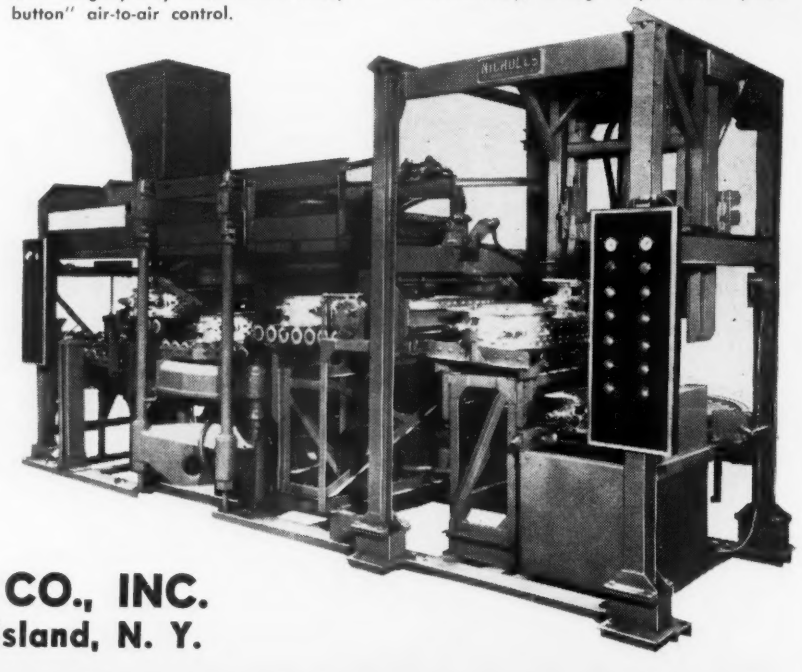
Can You

- Push your "Stop" button and then after a pause, push your "Start" button and have your equipment continue with the next phase?
- Push your "Stop" button and then after pushing several "Manual" buttons for subsequent phases, push the "Start" button and have your equipment continue automatically with the next phase?
- Use a particular "Manual" button to pinch-hit in an emergency for a failed automatic phase in finishing out a molding shift?
- Get 240 molds per hour (one every 15 seconds) hour after hour, shift after shift, day after day?

. . . YOU CAN WITH NICHOLLS AIROMATIC AUTOMATIC MOLDING MACHINES

Old, worn or outdated machines can cost you *more*, in wasted man-hours, lagging production and bottled-necked sales, than the price of new equipment. Take a look at yours *today*. Whatever your system, there's a Nicholls machine to fit the job. For information call or write—

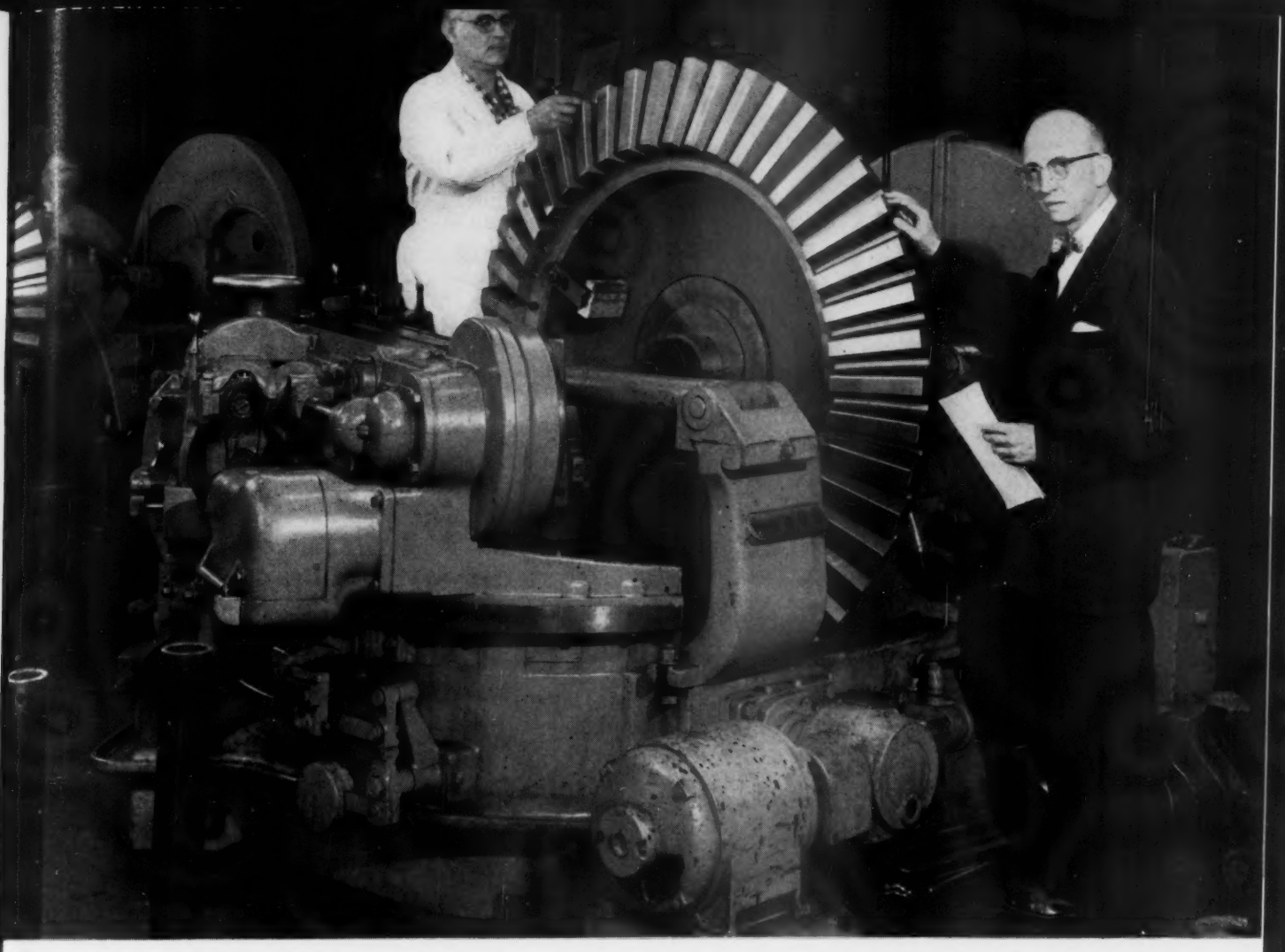
#21 TYPE "C" AIROMATIC AUTOMATIC DRAG MOLDING UNIT. One of the new NICHOLLS AIROMATIC molding machines that make, close, remove and return *consistent high-quality* molds *continuously . . . automatically*, through dependable "push-button" air-to-air control.



WM. H. NICHOLLS CO., INC.
Richmond Hill 18, Long Island, N. Y.

NICHOLLS

• FOR HALF A CENTURY THE BEST IN MOLDING EQUIPMENT



E. B. Smiley, Metallurgist for Illinois Gear & Machine Co., looks over setup of large, heavy duty bevel gear made from molybdenum alloy steel casting. This gear has been rough turned, rough cut and heat treated to 269 to 302 Brinell before finish cutting.

For Strength, Hardness and Machinability gear maker recommends Molybdenum Alloy Steels

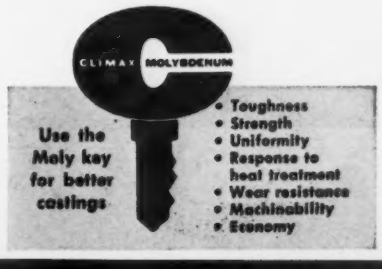
"All of our gears are made to customer specifications, and in many cases these include the use of molybdenum steels," says Mr. Smiley, metallurgist for Illinois Gear & Machine Co. "When our customers specify heat-treated gears of plain carbon steel," Mr. Smiley continues, "we often recommend that they change to 4140 alloy containing molybdenum to achieve high strength and hardenability with good machinability."

Moly steels offer gear users many advantages over carbon steel. Their greater strength and toughness permit the use of smaller weight-saving gears to transmit a given amount of power. Reduced weight and size of gear housings and other components add to the economy of moly steels. And their higher endurance is an important safety factor.

The properties of moly steels are discussed in a new booklet "Moly Steels for Cast Gears". Full technical assistance is also yours for the asking. Write Climax Molybdenum Co., Dept. 20, New York 36, N. Y.

Circle 616 on Inquiry Card—Page 219

CLIMAX MOLYBDENUM



EASY ON THE DRAW

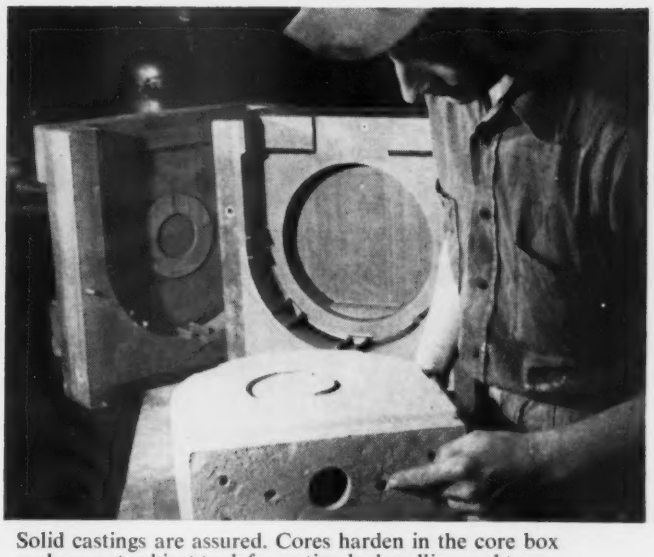
...every core comes clean!

The Air-Powered CP Core Box Vibrator really increases core output! Sledging is eliminated . . . core box maintenance is reduced . . . and there's no troweling. Simply clamp the vibrator to the inverted box, its 9000 orbital vibrations per minute assure a clean, perfect draw . . . no flaws, damaged edges, distorted sections or dimensional variations. The fast acting air clamp of the CP-219 grabs any cleat up to 6 inches – frees cores weighing up to 3000 pounds in less than 90 seconds! No special adaptors or fixtures are required. Write for details. *Chicago Pneumatic Tool Company, 8 East 44th Street, New York 17, New York.*

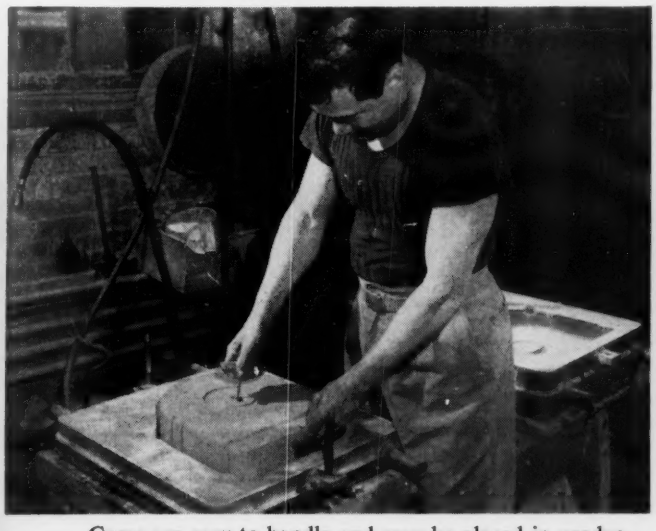
Chicago Pneumatic

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

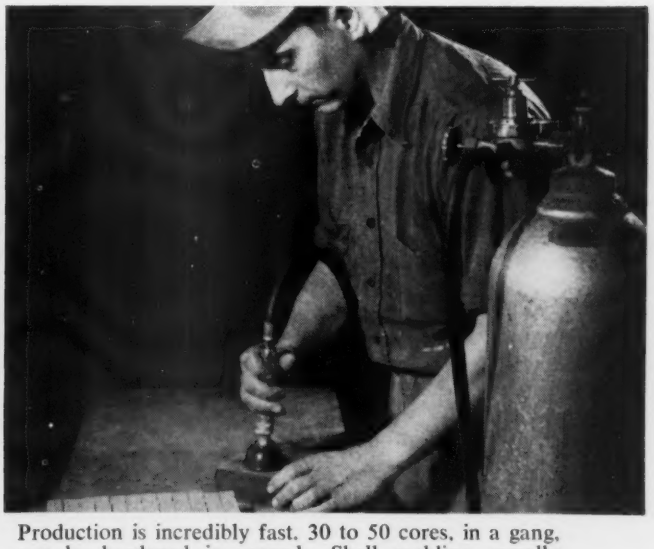
This process eliminates the use and cost of heavy equipment, and can be located anywhere in a foundry. It is ideal for shooting machines, shell molding and hand ramming.



Solid castings are assured. Cores harden in the core box and are not subject to deformation by handling and transporting. Extremely small tolerances can be maintained.



Cores are easy to handle and may be placed in production immediately, or, they can be stored at normal temperatures. Obnoxious fumes are eliminated. Sand recovery is excellent.



Production is incredibly fast. 30 to 50 cores, in a gang, can be hardened in seconds. Shell molding—usually complicated—is simple and inexpensive. Rejects caused by hot tear are reduced to a fraction.

Carbon Dioxide process hardens molds and cores in 5-to-15 seconds—eliminates ovens!

The carbon dioxide injection process is the first and only method of "baking" molds and cores without heat. Pureco CO_2 used in conjunction with specially prepared water glass binders can reward foundrymen with phenomenal savings in time, space, and capital investments while providing unprecedented flexibility. See your Pureco man for full information.

- **Eliminates baking ovens . . . saves time**
- **High dimensional stability of cores**
- **Fewer wires and core grids required**
- **No dry shells for cores**
- **Eliminates fumes when pouring**
- **Reduces rejects**

AT THE FRONTIERS OF PROGRESS YOU'LL FIND . . .

AN AIR REDUCTION PRODUCT

PURECO CO_2

Pure Carbonic Company

A Division of Air Reduction Company, Incorporated

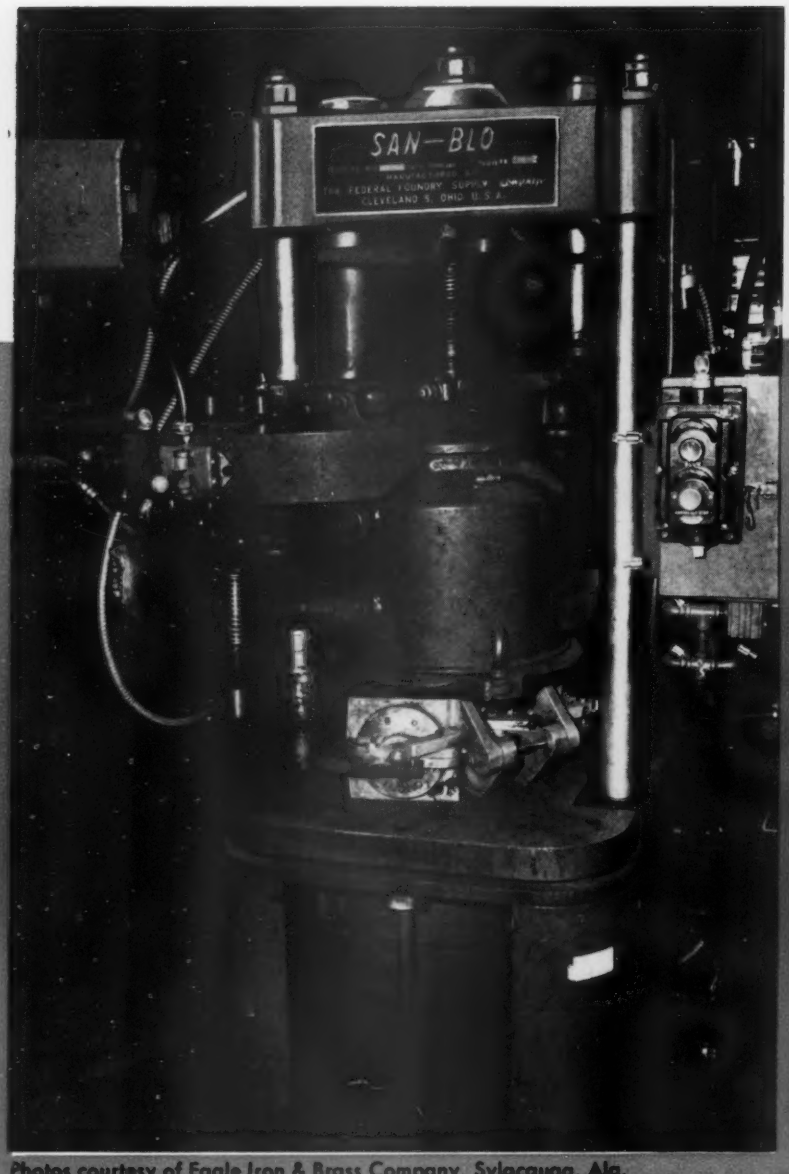
General Offices: 150 East 42nd Street, New York 17, N. Y.

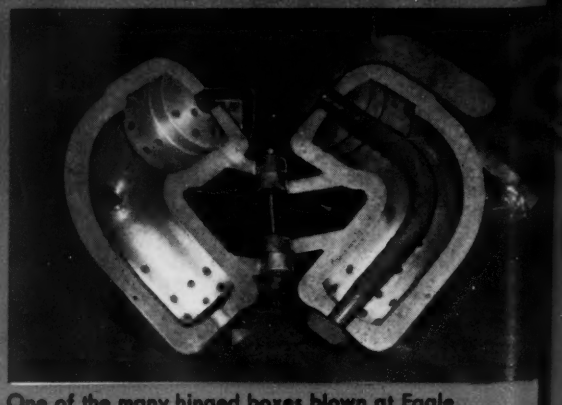
PURE CARBONIC COMPANY is a division of **AIR REDUCTION COMPANY, INCORPORATED** • Principal products of other divisions include: **AIRCO** — industrial gases, welding and cutting equipment and acetylenic chemicals • **OHIO** — medical gases and hospital equipment • **NATIONAL CARBIDE** — pipeline acetylene and calcium carbide • **COLTON** — polyvinyl acetates, alcohols and other synthetic resins.

Today— PIPE FOUNDRIES SLASHING COSTS OF

. . . *blowing*

- **Greatly increased core production!**
- **Substantially lower core costs!**
- **Better quality and uniformity!**
- **Much easier shakeout!**





Photos courtesy of Eagle Iron & Brass Company, Sylacauga, Ala.

One of the many hinged boxes blown at Eagle.

Circle 619 on Inquiry Card—Page 219

USE SAN-BLO's® FOR PIPE FITTING CORES...

regular molding sands!

Some of the pin and bushing boxes blown at Crown.

Photos courtesy of Crown Pipe & Foundry, Inc., Jackson, Ohio

COULD BE ?

Perhaps some of your dry sand cores might be blown on the SAN-BLO with *green sand*, to eliminate oven time and save on expensive binders! Might be a good thing to check!

Manufactured by

MEMBER FEMA FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION

San-Blo Division

The FEDERAL FOUNDRY SUPPLY Company

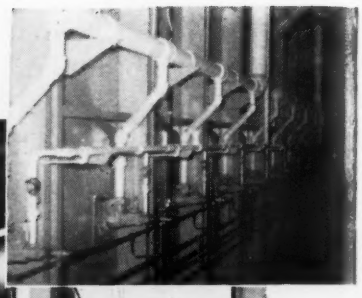
4600 EAST 71st STREET · CLEVELAND 5, OHIO

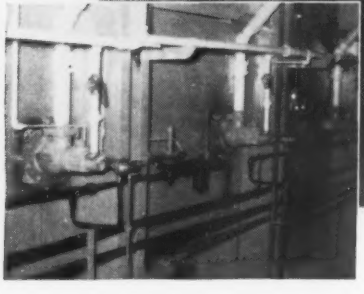
Photos courtesy of Eagle Iron & Brass Company, Sylacauga, Ala.

One of the many hinged boxes blown at Eagle.

Circle 619 on Inquiry Card—Page 219

uniform HEAT for BIG jobs!





at morgan engineering—alliance, ohio

This 52' x 21¼' x 17½' high car bottom furnace was designed by Morrison Engineering to stress relieve heavy weldments. The furnace is available for use by other firms on a subcontracting basis. It has the second largest car bed area of any such furnace in the world.

Imagine getting a **uniform heat** throughout a 250,000 pound load of steel with 3" to 10" thick sections in such a huge furnace! 48 North American No. 223-4 Dual-Fuel Burners do the trick. These burners, arranged in 4 banks and 3 zones, can burn 250 gallons of oil per hour, releasing 33 million Btu. They maintain a stable fire even when operating with a large amount of excess air to attain good temperature uniformity.

All the air is supplied by a North American Turbo Blower. North American pilots, valves, and Ratiotrols provide a safe, effective control system.

for additional information consult your local n. a. engineer or write for bulletin 223

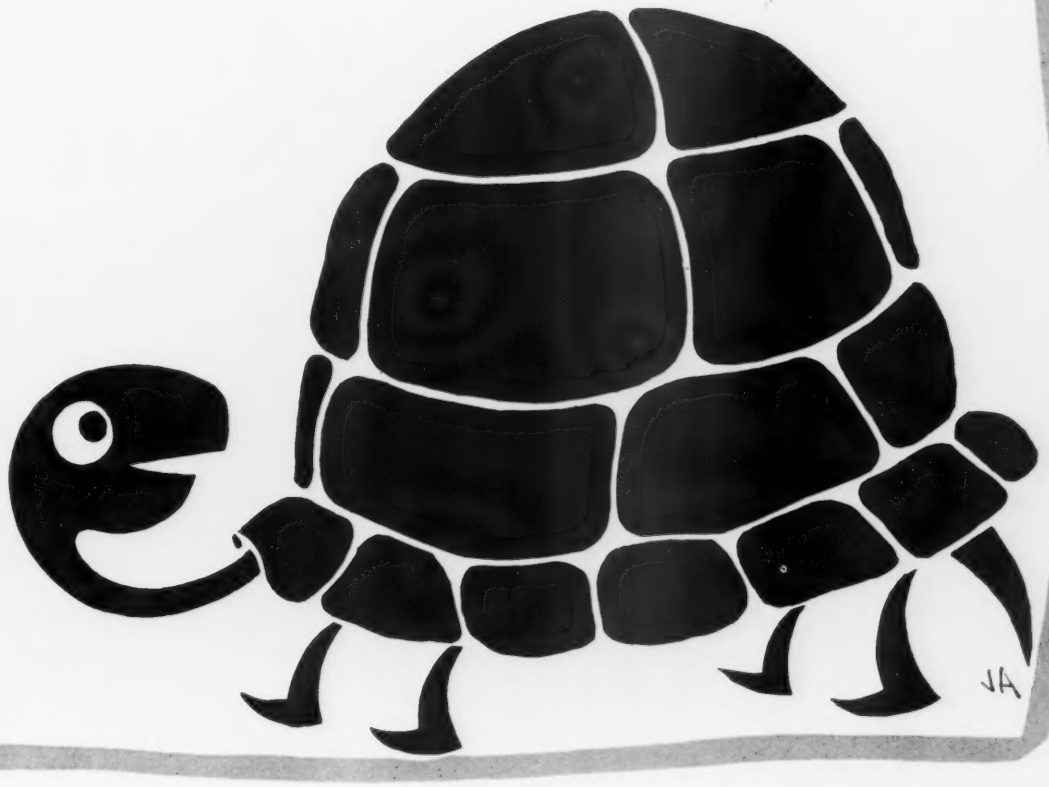
NORTH AMERICAN COMBUSTION since 1917

the **NORTH AMERICAN** mfg co

Combustion Engineers

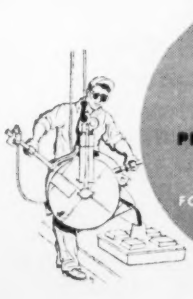
4455 East 71st St. • Cleveland 5, Ohio

"Think this is something?...



you ought to see what you can do with

Plenco shell molding resins"



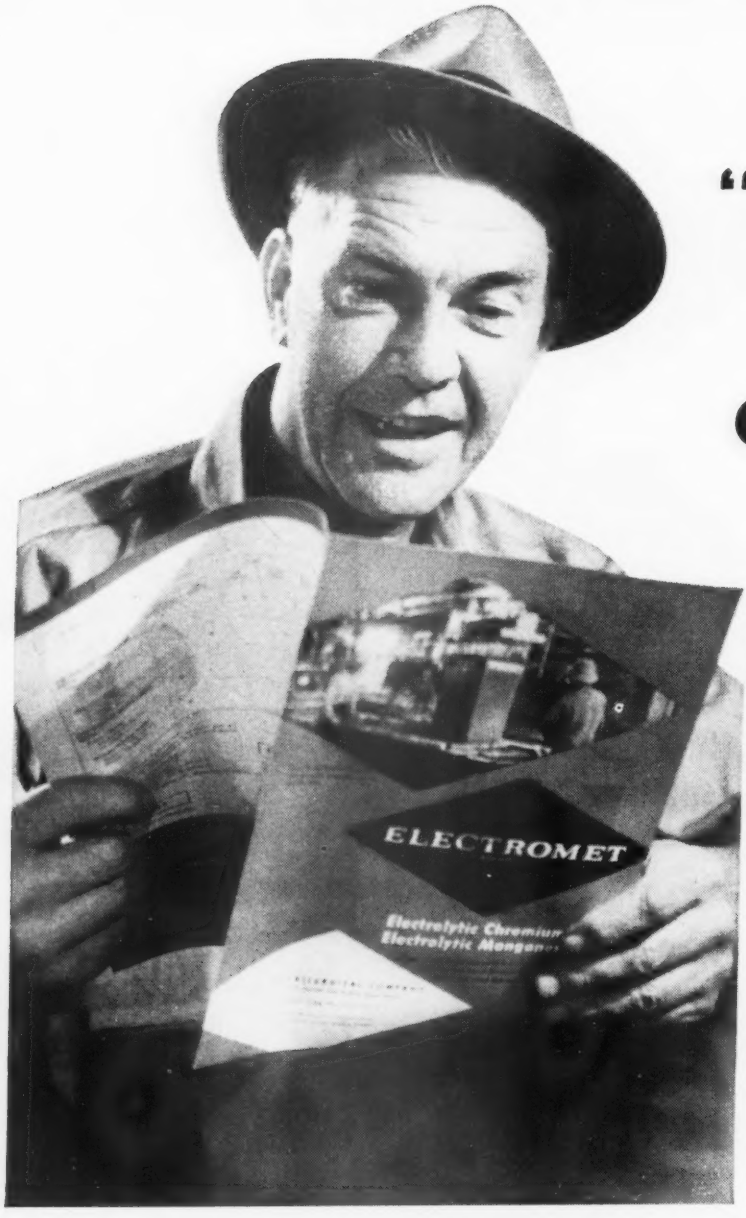
PLENCO PHENOLICS
FOR BETTER PLASTIC PRODUCTS

PLASTICS ENGINEERING COMPANY
Sheboygan, Wisconsin

We're not sticking our necks out when we say there can be definite economic and production advantages for you by shell molding with dependable, versatile Plenco resins. Many a foundry can vouch for that statement. Their profitable experiences with Plenco engineering and research are being repeated every day. Why don't you investigate?

Serving the plastics industry in the manufacture of high grade phenolic molding compounds, industrial resins and coating resins.

Circle 621 on Inquiry Card—Page 219



"SAY, THIS CAN HELP ME!"

And ELECTROMET'S booklets can also help you—the metallurgist, the melter, the designer and fabricator, the engineer. Here's a wealth of valuable data, graphs, and technical information on stainless steel... all from ELECTROMET's extensive technical library. Some booklets discuss the new chromium-nickel-manganese steels. Others deal with the decarburizing and reducing cycles of stainless steel melting.

Listed below are the latest booklets available from ELECTROMET on stainless steel. All you have to do to get your free copies is to circle the appropriate numbers on the coupon and mail the coupon today.

Cr-Ni-Mn Steels

1. **NEW STAINLESS STEELS CONTAINING 17% Cr—4% Ni—6% Mn and 18% Cr—5% Ni—8% Mn.** Circle AISI.

2. **AUSTENITIC CHROMIUM-MANGANESE-NICKEL STEELS CONTAINING NITROGEN.** Circle F-8775.

3. **ELECTROLYTIC CHROMIUM AND MANGANESE BOOKLET.** Circle F-20,025.

New Stainless Steels

4. **NEW STAINLESS STEELS.** High-manganese, extra low-carbon, wrought precipitation-hardenable, and cast precipitation-hardenable grades. Circle F-20,024.

Melting Practices

5. **OBSERVATIONS OF STAINLESS STEEL MELTING PRACTICES.** Circle F-20,006.

6. **OXYGEN BLOWING RATE IN STAINLESS STEEL MELTING.** Circle F-20,032.

7. **ECONOMIES IN MAKING STAINLESS.** Further data on oxygen blowing rate. Circle F-20,040.

For a complete list of ELECTROMET literature that is available to you, free of charge, circle F-6924 on the coupon.

Electro Metallurgical Company
A Division of Union Carbide and Carbon Corporation
Distribution Section, Department C
30-20 Thompson Avenue, Long Island City 1, New York

Gentlemen:

Please send me, without obligation, the literature circled below:

AISI F-6924 F-8775 F-20,006 F-20,024
F-20,025 F-20,032 F-20,040

Name .....

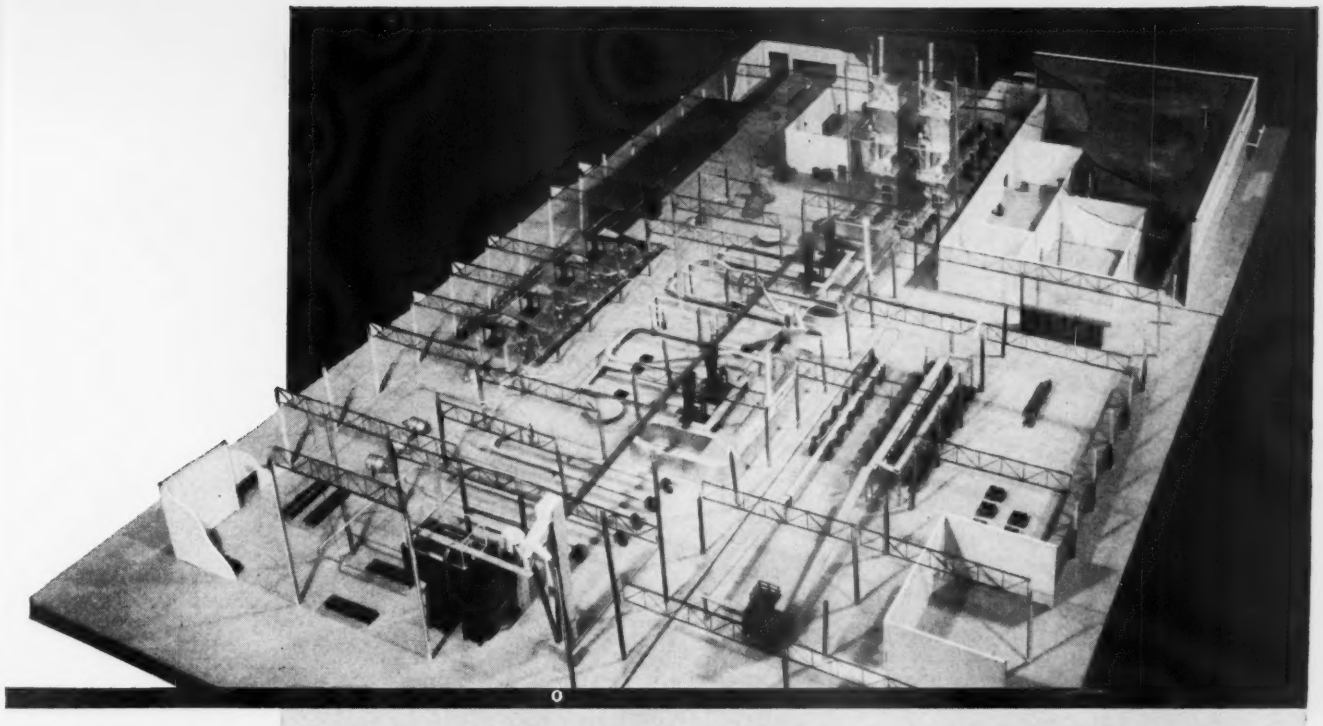
Company .....

Address .....

City ..... Zone ..... State .....

50th Anniversary Electromet — Half a Century of Development in Ferro-Alloys and Metals — 1906 ... 1956

The term "Electromet" is a registered trade-mark of Union Carbide and Carbon Corporation.



Knight services include:

Foundry Engineering
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Mechanization
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Methods
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Materials Handling
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Automation
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Survey of Facilities

AUTOMATION, SEMI-AUTOMATION, MECHANIZATION are a "must"

for profitable operation today of the Production and Production Jobbing Foundry

This model is a proposed modernization of an existing brass foundry. Operations are automated, semi-automated, and mechanized to a high degree to insure maximum productivity per man hour, with total production up to 12,000 tons of castings per year with a balanced 2-shift operation.

A reduction of approximately 55% is anticipated in man hours per ton of good castings, from new materials to finished castings ready for the machine shop. Working conditions are to be improved and more efficient controls of melting, sand, pouring, cores, and other variables should permit high quality castings with a minimum of scrap.

This program resulted from a survey of Knight Engineers with client personnel to determine, for this problem, the most modern technological improvements and new materials, methods, and controls that could be economically justified. Knight Engineers have made hundreds of surveys in all types, classes, and sizes of foundries to assist their clients to reduce costs, improve quality, working conditions, and financial return to workers, management, and owners.

Write for Knight Bulletin No 101, "Professional Foundry Engineering."

EVIDENCE OF EXPERIENCE

Lester B. Knight & Associates, Inc.

Management, Industrial and Architectural Engineers

MEMBER OF THE ASSOCIATION OF CONSULTING MANAGEMENT ENGINEERS, INC.

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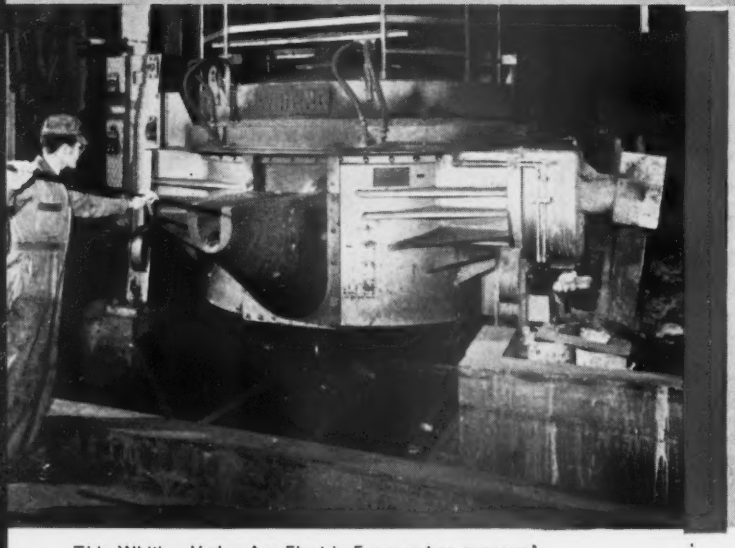
Next Page Circle 623→

Close-up view of one of the six Whiting Cupolas being tapped. A Whiting U-ladle is receiving metal and distributing it to a cylindrical ladle.



This Whiting Hydro-Arc Electric Furnace has a normal hot metal holding capacity of 31,650 pounds and a maximum capacity of 42,200 pounds.

One of the three main control panels which controls hot blast, U-ladle tilting, windbox pressure and other functions.

How a leading Foundry increased metal production!

A leading automotive foundry needed greater metal producing capacity to supply increasing demands for castings. To accomplish this they decided to expand operations and installed many types of Whiting melting equipment including six cupolas, hot blast, holding ladles and a Hydro-Arc electric furnace—all of the latest design—all incorporating important new features.

The Whiting cupolas are equipped with water jackets and are designed for hot blast operation. Auxiliary doors, located above the regular charging doors, permit the placement of sand for the cupola bottoms and for raising and lowering special lining repair rigs. Each cupola has a front slagging tap spout and a system for spraying the bottom drop at the end of the heat. A tapper platform extends the full length of the building to provide easy access to the tuyeres and front slagging spouts. Each cupola is equipped with its own stationary-type skip hoist charger with full cone-bottom controlled discharge buckets. The skip hoists are arranged for automatic push button control from a panel where the operator can observe the loading and charging operations. Provisions have been made in the control system so that the bucket can be stopped at any point in its travel and returned to the loading positions if desired. All the cupolas are served by monorail ladle carriers. Externally oil fired hot blast heaters are equipped with automatic temperature controls to regulate the blast air temperature to ±5° F.

The mixing and desulfurizing ladles are of a special design, ruggedly constructed with hinged type cover and supported from overhead superstructures. They receive molten metal from the cupola and supply the well reinforced cylindrical transfer ladles supported from hot metal carriers. These carriers are mounted on an I-beam track which electrically moves the ladles to the pouring floor areas.

The suspended feature of the mixing ladles provides a clear floor space beneath each ladle which promotes cleanliness and ideal working conditions.

The electric furnace is the latest model of a Whiting Hydro-Arc. It is a 10-ton capacity, cradle-tilt, duplexing type with a production rate of 20 tons per hour.

With this complete melting installation, the foundry increased production of metal to meet huge demands and strict schedules. In addition they have met high quality requirements at low cost. Whiting melting equipment has been the answer.

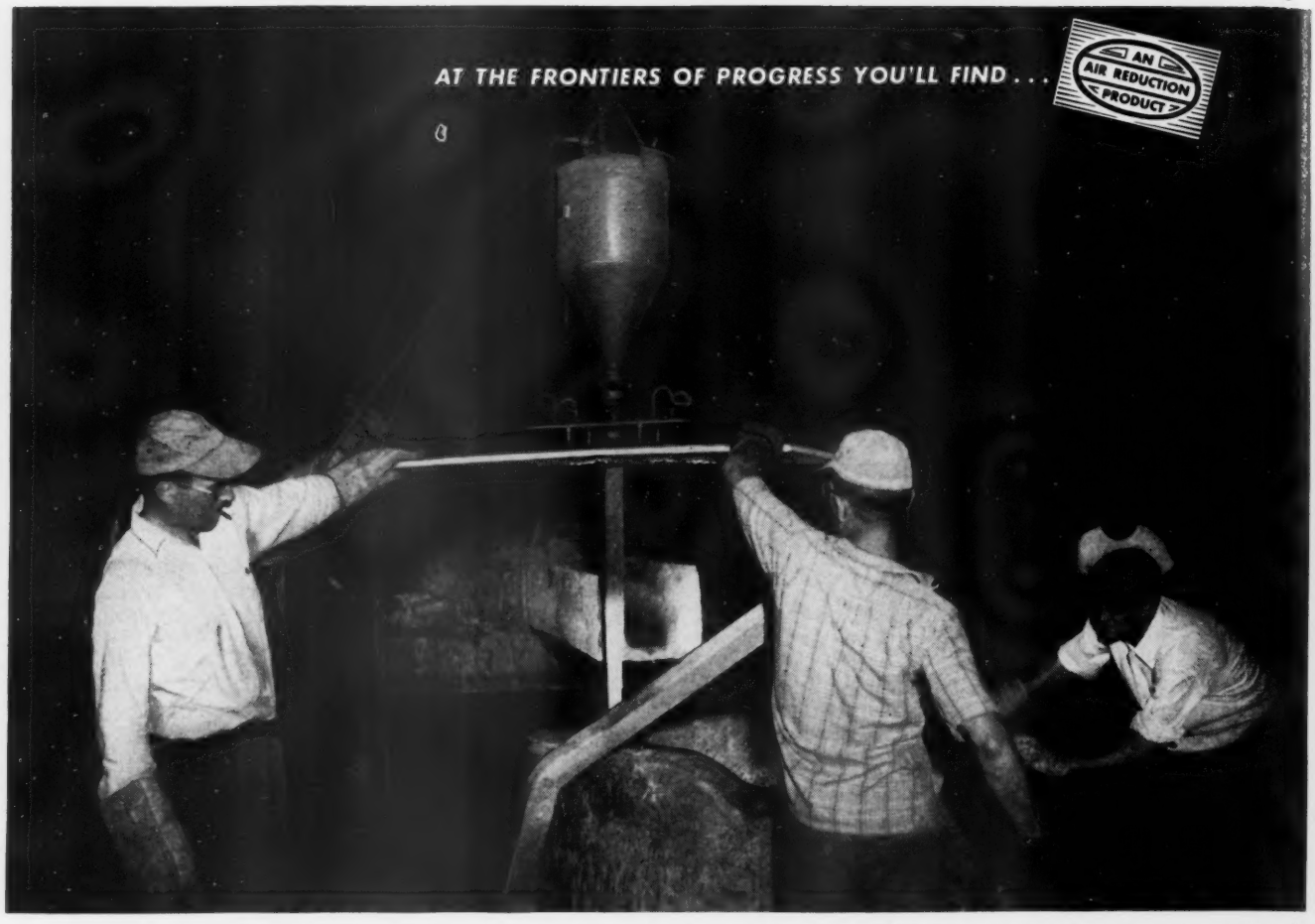
The complete story of the melting operations, as well as the make-up and charging operations in this foundry is told in the spring issue of the WHITING FOUNDER...write for a copy today!

WHITING CORPORATION

WHITING

15607 Lathrop Ave. Harvey, Ill.

Here is the line up of the six Whiting Cupolas. In front of each is a Whiting U-ladle.



Lowering of Airco batch feeder into ladle for injection of calcium carbide.

Now! Gray-Iron foundries can reduce cost of producing ductile iron

INEXPENSIVE AIRCO CARBIDE INJECTION PROCESS CAN SAVE UP TO 50% BY REDUCING NEED FOR EXPENSIVE ALLOYS

Calcium carbide, dry nitrogen and a simple, inexpensive batch feeder are all that gray iron foundries need to reduce production costs of ductile iron, thanks to a new process developed by Airco.

When finely ground Airco No. 20 Special Carbide is injected with nitrogen into molten iron, the desulphurization is so uniform and efficient that ductile iron can be produced from acid cupola iron after carbide treatment. The low sulphur content of carbide treated irons—as low as 0.01% means the quantity of expensive alloys may be reduced with no sacrifice of mechanical qualities. Users of the new process have reported substantial savings by substituting less expensive alloys. Another feature of the process is its flexibility, since by using carbide treatment the same cupola charge may be used for producing a variety of grades of iron.

The new calcium carbide injection process is the result of Airco Technical Service's continuing effort to find new, profitable techniques for customers. If you have a cutting, welding or metallurgical problem, why not ask Airco to help you? Write to your nearest Airco office.

AIRCO®

AIR REDUCTION

150 East 42nd Street • New York 17, N. Y.

Divisions of Air Reduction Company, Incorporated, with offices and dealers in most principal cities
Air Reduction Sales Company
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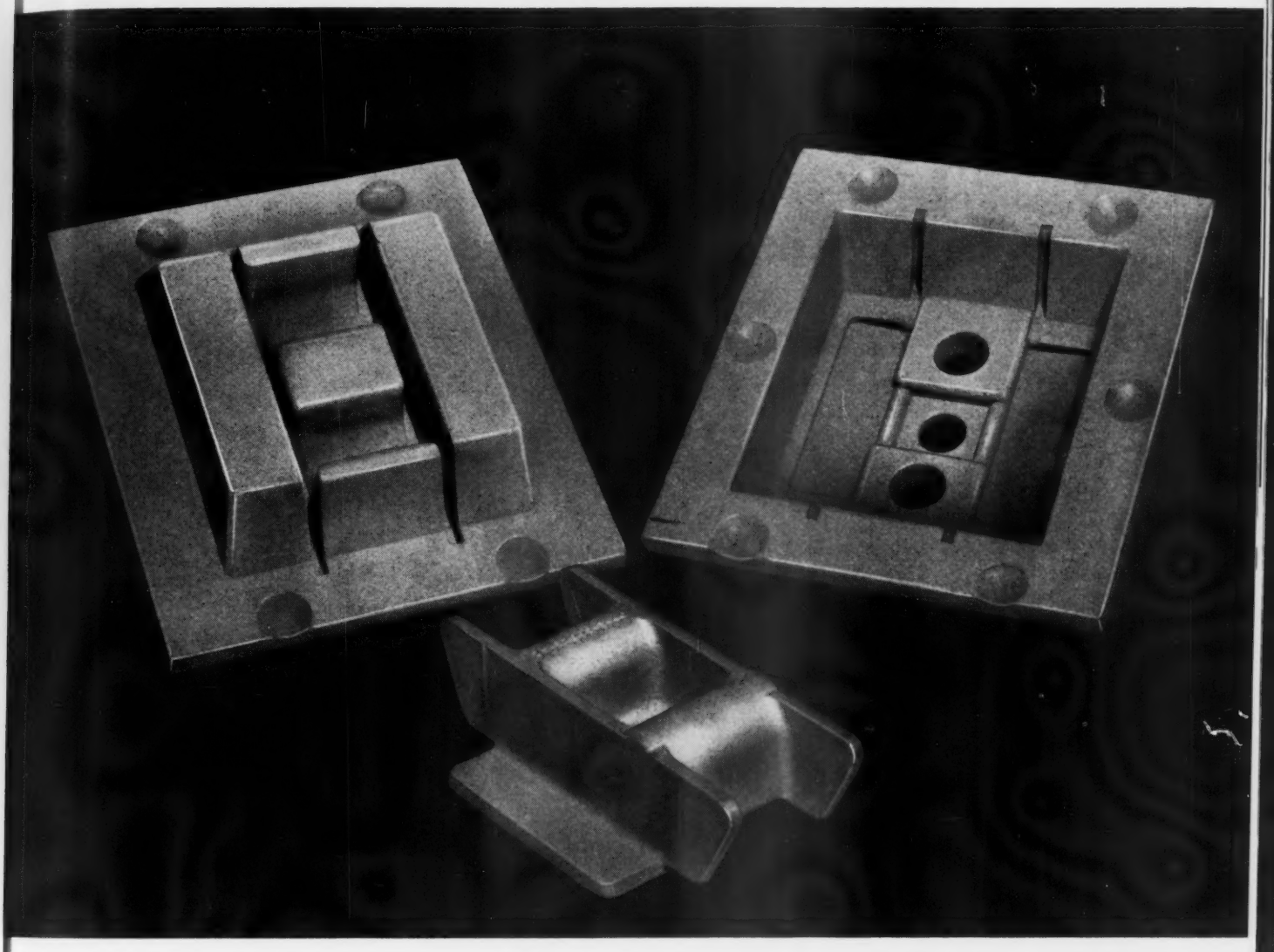
Products of the divisions of Air Reduction Company, Incorporated, include: **AIRCO** — industrial gases, welding and cutting equipment, and acetylenic chemicals • **PURECO** — carbon dioxide, liquid-solid ("DRY-ICE") • **OHIO** — medical gases and hospital equipment • **NATIONAL CARBIDE** — pipeline acetylene and calcium carbide • **COLTON** — polyvinyl-acetates,—alcohols, and other synthetic resins.

Circle 625 on Inquiry Card→

Monsanto announces newly developed

RESINOX* COLD COATING RESINS



Improved phenolic coating resins for shell molding reduce mixing time—eliminate caking problems of stored coated sands!

From the Foundry Research Laboratory at Monsanto comes a new Resinox formulation to improve the efficiency of your shell molding operations.

Resinox Cold Coating Resins have been extensively field-tested with dump box and blowing equipment—and have demonstrated outstanding free-flowing and non-segregation characteristics. With normal coating practice no caking is encountered in the coated sand.

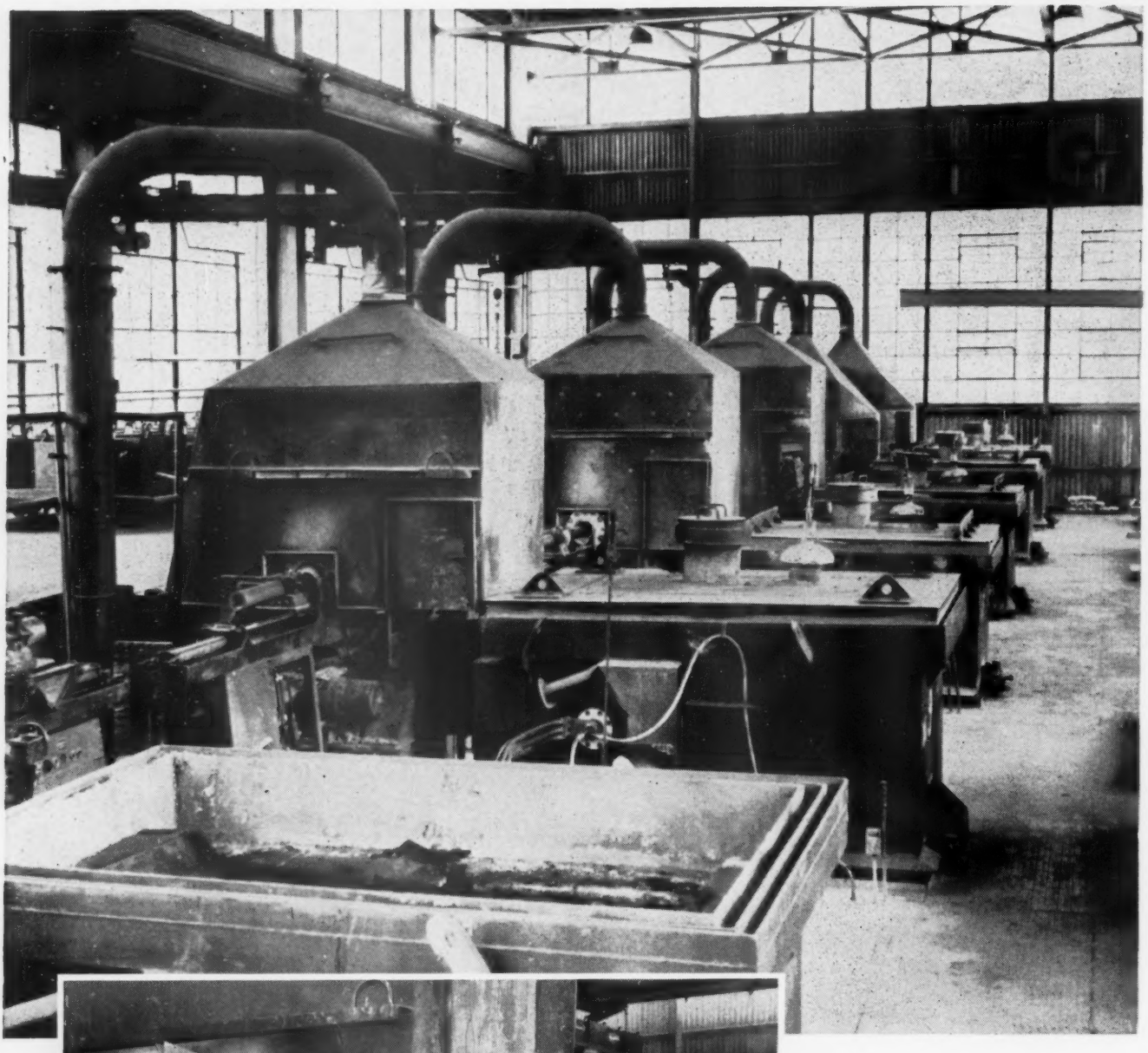
The new Monsanto resins simplify coating formulation—just weigh out solvent and resin, then mix with sand. Using either the alcoholic deposition or liquid coating technique, the mixing cycle is appreciably shortened.

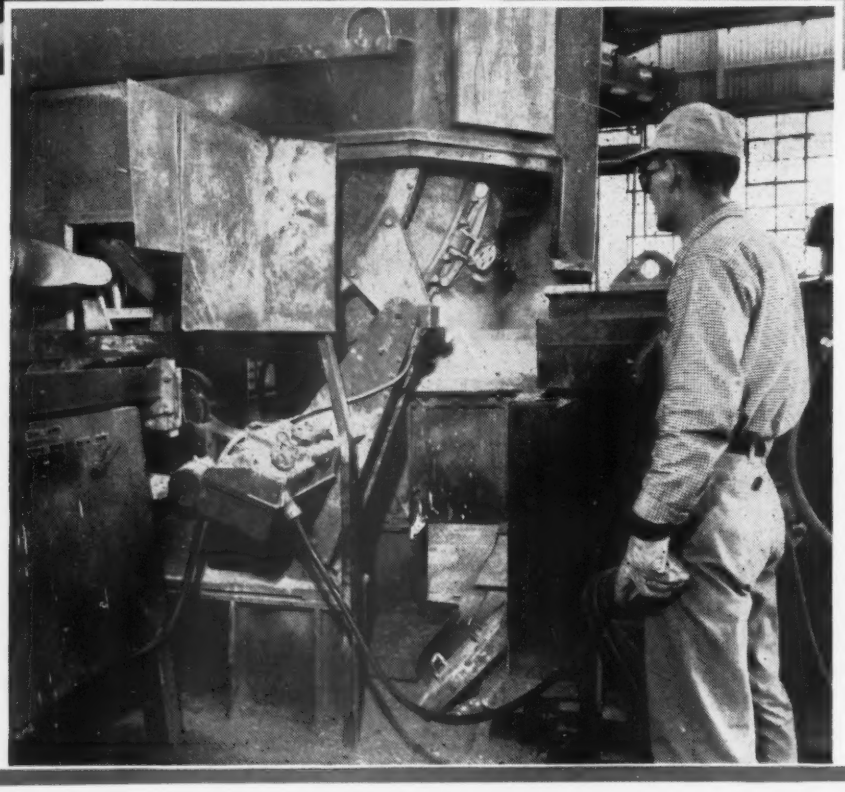
The shell molds made with these resins have excellent finish with superior hot strength and detail accuracy. Castings produced require little or no finishing. Edges are sharp and clean—intricate detail is no problem.

Because the economy and quality of shell molding depends so much on the resin used, you will want more specific information on this development. Send for data sheets and literature on the new Resinox Cold Coating Resins. Write Monsanto Chemical Company, Plastics Division, Room 453, Springfield 2, Massachusetts.

MONSANTO

*Resinox: Reg. U. S. Pat. Off.





A view of the ASARCO furnace floor, showing some of the Detroit furnaces used in continuous casting.

A melt being poured from a Detroit Rocking Electric Furnace into its receiving box.

DETROIT

Metal for CONTINUOUS CASTING at ASARCO is melted in Detroit ROCKING Electric Furnaces

In the revolutionary method of continuous casting bronze alloys at ASARCO, an uninterrupted flow of molten metal is essential. Five 4-story-high vertical production lines operate around the clock, with molten material entering the top and the solidified product, in lengths up to 16 feet and diameters up to 9 inches, delivered at the bottom.

To do the melting, ASARCO uses a battery of Detroit Rocking Electric Furnaces. Raw material is supplied to these furnaces in an almost constant stream. The furnaces are built for lip-tilting and melts are poured into receiving boxes connected to the furnaces. From these boxes the metal flows to the casting furnace and then out through water-cooled graphite dies.

• • •

The qualities that led American Smelting and Refining Company to select Detroit Electric Furnaces for this application will also recommend them to you.

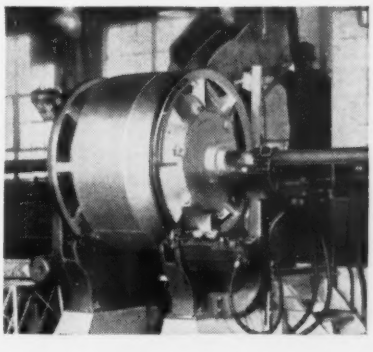
HIGH PRODUCTION—The indirect arc, operating inside the enclosed furnace, generates high heat quickly. Melts are brought to desired temperature in almost exactly the same elapsed time through cycle after cycle—a very important characteristic when production is geared to the metal supply.

POSITIVE QUALITY CONTROL—Metallurgical control is simple and positive with Detroit Rocking Electric Furnaces. The electrodes are free of the bath at all times, so carbon pickup is eliminated. Superheating to get high physicals is easily done.

EFFICIENT, LOW-COST OPERATION—Rocking action washes molten metal over the refractory, picking up heat otherwise wasted. Design and functioning of the furnace assures optimum power utilization. And there's less metal shrinkage in a Detroit!

AUTOMATIC—Rocking action is automatically controlled. Any desired angle of initial rock can be set for any desired length of time. Then the rock will increase to full rock (140°) in another desired time. Thus the most efficient cycle can be automatically duplicated all day long. Electrode controls are also automatic, to furnish fastest melting speed with lowest power consumption.

Investigate Detroit Rocking Electric Furnaces for your metal melting operations. For ferrous and non-ferrous metals and alloys. Capacities from 10 to 10,000 pounds. Write, outlining your requirements, for specific information.



DEF Type LFY, 175 K.W., 700-lb. capacity.

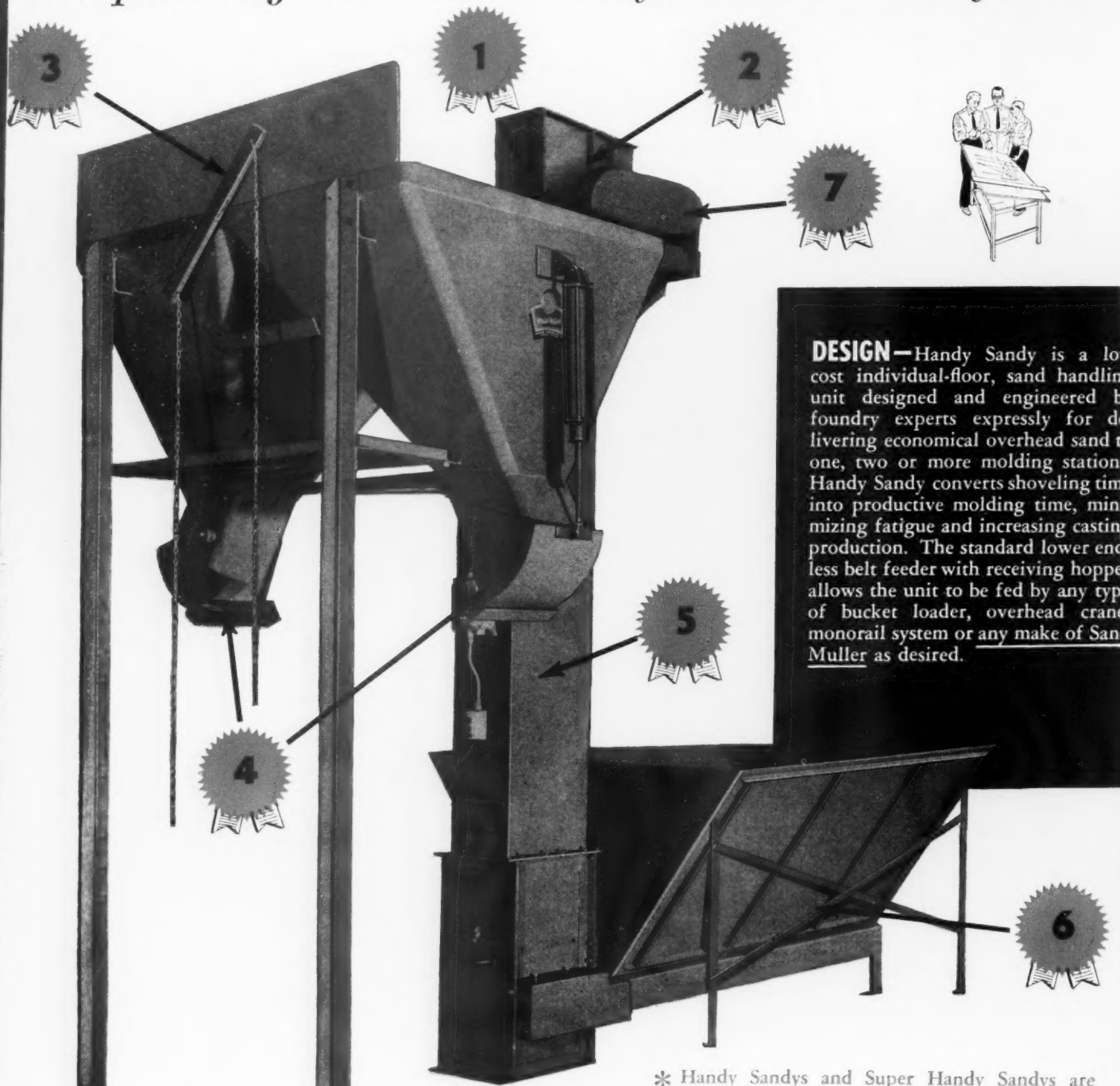
ELECTRIC FURNACE DIVISION

Kuhlman Electric Company • Bay City, Michigan

Foreign Representatives: in BRAZIL—Equipamentos Industrias, "Eisa" Ltd., Sao Paulo; CHILE, ARGENTINA, PERU and VENEZUELA: M. Castellvi Inc., 150 Broadway, New York 7, N. Y.; MEXICO: Cia Proveedora de Industrias, Atenas 32-13, Apartado 27A3, Mexico 6, D. F., Mexico; EUROPE, ENGLAND: Birlec, Ltd., Birmingham

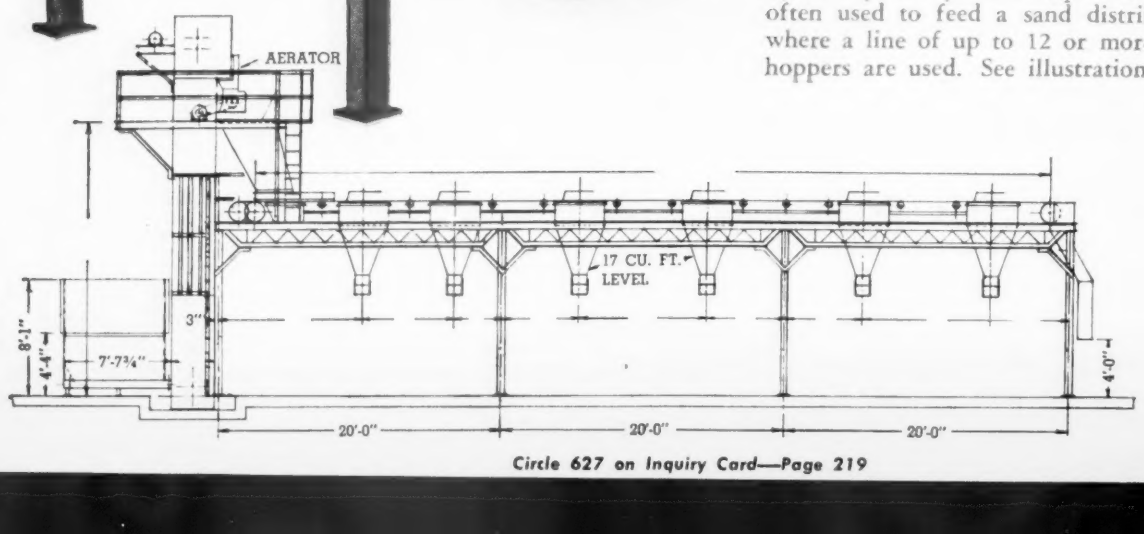
HERE'S WHY 1,000 HANDY SANDYS

are proving their value in foundries everywhere



DESIGN—Handy Sandy is a low cost individual-floor, sand handling unit designed and engineered by foundry experts expressly for delivering economical overhead sand to one, two or more molding stations. Handy Sandy converts shoveling time into productive molding time, minimizing fatigue and increasing casting production. The standard lower endless belt feeder with receiving hopper allows the unit to be fed by any type of bucket loader, overhead crane, monorail system or any make of Sand Muller as desired.

* Handy Sandys and Super Handy Sandys are often used to feed a sand distribution conveyor where a line of up to 12 or more overhead sand hoppers are used. See illustration below.



Circle 627 on Inquiry Card—Page 219

1

EPARATE BUILT-IN AERATOR

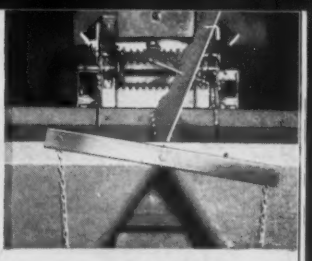
With separate drive at the head of he elevator actually cuts, blends and preads sand as it is discharged into he overhead hoppers. Handy Sandy oes not depend on a high-speed levator discharge to "throw" sand nto the hopper. Separate aeration is so maintained when Handy Sandy used with a distributing belt to ed a series of hoppers in line.*

2

AUTOMATIC SAND SHUTOFF

This automatic shutoff prevents overloading in overhead hoppers. Sand elevator and feeder stop automatically when sand reaches a predetermined level in the overhead hopper. The molder simply starts the machine which operates until hoppers are full, then automatically shuts off. Automatic starting control available as optional equipment.

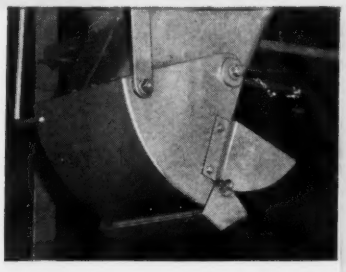
3



SAND VOLUME EQUALIZER

On the twin hopper Handy Sandys the Newaygo engineered sand volume equalizer proportions the amount of sand going into each hopper. Sand is easily controlled by the operator to compensate for unequal hopper requirements.

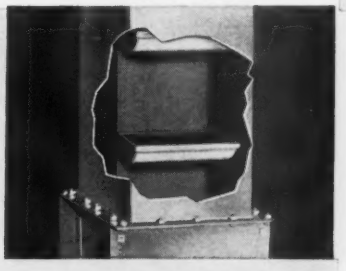
4



RIBBLE GATES

nother Newaygo engineered de-lopment. The overhead dribble te seals tightly when closed and revents sand particles from drop-ng into the prepared mold.

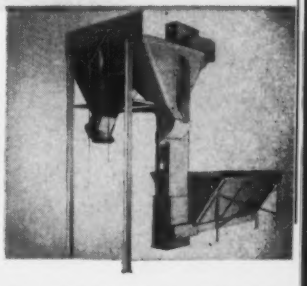
5



BUCKET ELEVATORS

Feature full width, heavy duty belts supporting a series of cast buckets. Also available with heavy duty chain belt. Elevator runs at moderate speed. This means less power requirement and keeps maintenance at a minimum. Elevator head and boot are designed with quick-opening access doors to all moving parts.

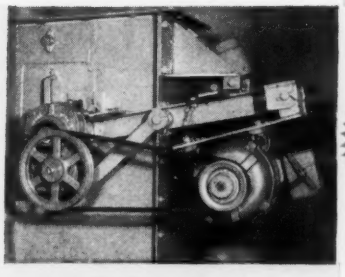
6



LOWER SAND STORAGE HOPPER WITH ENDLESS BELT FEEDER TO ELEVATOR BOOT

Standard Handy Sandys have a capacity of 8 to 10 tons of sand per hour. The lower feed hopper can be supplied with storage capacity up to 12 tons of sand. Super Handy Sandys have sand capacities up to 40 tons per hour.

7



AUTOMATIC ELEVATOR TAKEUPS

Air operated and 100% automatic. Assures positive alignment of head shaft at all times and controlled tension on the elevator belt or chain, speed reducer and aerator V-belt drives, without manual attention.

8

FLEXIBILITY

The unlimited variations in floor arrangements, hopper sizes and shapes have resulted in the successful use of Handy Sandys on molding floors in large and small foundries. No pits or foundations are necessary. Other applications include feeding core and mold blowers, shell molding machines and sand mullers.

9

LESS HEADROOM

The overall height of the Standard Handy Sandy is 13′ 1⅛″. This is several feet less than other makes, and is an important consideration in foundries with limited headroom.

10

EIGHT STANDARD MODELS TO CHOOSE FROM

Model No.	Type of Hopper Station	Type of Outlet	No. of Outlets
HS-4-G	Single	Single Leaf	1
HS-4-D	Single	Hand Pull Out	1
HS-4-GT	Double	Single Leaf	2
HS-4-DT	Double	Hand Pull Out	2
HS-7-G	Single	Single Leaf	1
HS-7-D	Single	Hand Pull Out	1
HS-7-GT	Double	Single Leaf	2
HS-7-DT	Double	Hand Pull Out	2

Special Hoppers and Gates available to suit all types of molding machines.

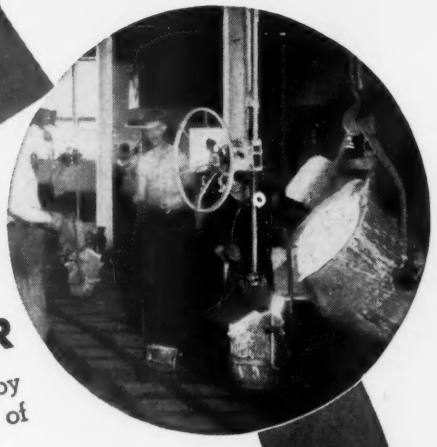
Send for Bulletin No. 56

32 pages of information and specifications on the complete line of Newaygo Sand Handling, Mold Handling and Mold Making Equipment

NEWAYGO engineering company
NEWAYGO, MICHIGAN

Manufacturers of Neway® Mold Handling, Sand Handling and Conditioning Equipment

CUPOLA TO BULL LADLE



POURING LADLE TO MOULDS

MOLDS POURED 2 to 3 TIMES FASTER

Both workers and management of many foundries are profiting by installations of Cleveland Tramrail. Hard lifting and carrying of heavy ladles are eliminated. Production is speeded and costs cut.

The photographs are of a typical installation. Large molds are poured with bull ladles carrying metal direct from cupola without repouring. Small molds are poured with 200 lb. mechanical ladles conveyed on Tramrail cranes. Four such ladles replaced many old type 50 lb. hand ladles.

Workers here are enthusiastic about Cleveland Tramrail equipment. It promotes their health and leaves them fresher at the end of a day. Management is happy because molds are poured 2 to 3 times faster than formerly.

Heat loss is less because pouring ladles are larger and metal reaches molds in faster time.

GET THIS BOOK!

CATALOG No. 2008 gives construction and engineering details. Profusely illustrated.

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
3822 East 286th Street Wickliffe, Ohio

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

The Test Bar Mirrors the Quality of the Product Casting

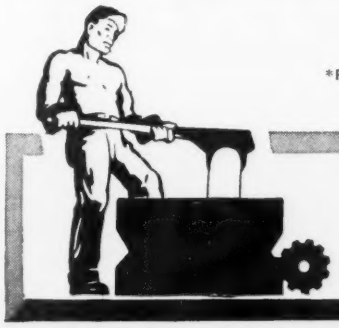
When the Metal is FRONTIER 40-E* Aluminum Alloy!

Whether you purchase Frontier 40-E Aluminum Alloy castings direct or from a foundry licensed to produce this alloy, you can be sure that the high qualities that have made this alloy famous are being maintained. How is this controlled? Test bars are required from all licensees. These are sent to the technical research laboratory of the Frontier Bronze Corp. for complete analysis and physical testing.

One of the most unusual features of Frontier 40-E Aluminum Alloy is the fact that the physical properties which spell high quality in the test bar appear uniformly throughout a large casting. And since Frontier 40-E is a non-heat-treated aluminum alloy the high strength physical properties are obtained by natural aging at room temperatures. The high yield strength of Frontier 40-E Aluminum Alloy is of special value in designing parts that must be light in weight and yet resist distortion or deformation.

Yes, the test bar mirrors the quality of the product casting . . . here's proof.

FRONTIER 40-E	TEST BAR	CASTING
Yield Strength	23,500	22,700
Tensile Strength	36,600	35,500
Elongation	7.5	7.5



*REG. T. M.

Please send me a copy of the Alloy Data Book giving Engineering and Metallurgical Facts on the physical properties of Frontier "40-E".

NAME.....

COMPANY.....

ADDRESS.....

CITY..... STATE.....

FRONTIER BRONZE CORPORATION

4878 PACKARD ROAD, NIAGARA FALLS, NEW YORK

New LINDBERG–FISHER Autoladle

Here, for the first time, is a ladling unit that makes automatic casting of aluminum not only possible but practical. The Autoladle has been thoroughly tested and proven in service.

"LITTLE JOE" provides these advantages:

- Adaptable to induction, electric resistance or fuel-fired reverberatory furnaces.
- Ladled metal is withdrawn from beneath surface of bath.
- Precise, accurate control of any size shot up to 30 lbs.
- No interruption of the casting cycle during charging of metal.
- No variation of size of shot due to metal level changes.
- Composed of special refractory materials so arranged that ladled metal cannot come in contact with any metal.

We call it

"LITTLE JOE"

To the best of our knowledge this is the first practical automatic ladling unit yet devised. It will fill an important need in many casting operations. For complete information, get in touch with your nearest Lindberg Field Representative (see your classified phone book) or write direct.

You can see "Little Joe" in operation at the Metal Show in Cleveland

LINDBERG FISHER MELTING FURNACES

A Division of Lindberg Engineering Company, 2453 West Hubbard Street, Chicago 12, Illinois

Circle 630 on Inquiry Card—Page 219

Prompt service from local Michigan Distributor, Deeds Equipment Co., is one of many reasons Marion Foundry is so pleased with their new Model 12B Tractor Shovels. Marion has made gray iron castings for over 50 years.

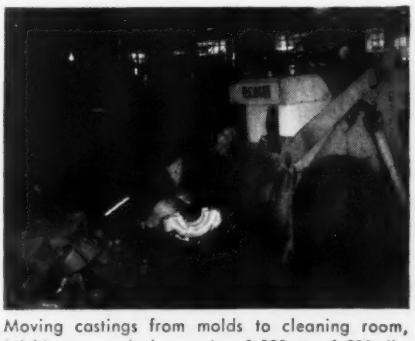
Axle breakage,
low production problems solved . . .

Indiana foundry boosts sand output to 200 tons hourly with 2 Michigans

Like many foundries, Marion Machinery Foundry & Supply Company of Marion, Indiana, had always taken the frequent troubles on their loaders pretty much for granted. No matter what make they used, rough service, typical of foundries everywhere, caused continual high maintenance. Low output was a problem, too, because machines rarely could heap and carry a full bucket.

Performance earns repeat order

Then, early in 1956, the new Michigan 15 cubic foot Model 12B Tractor Shovel became available. Marion officials took a long look at it. They studied its trouble-free all-Clark power train (including power-shift transmission, torque converter, and planetary axle). They bought one. Two months later, they bought another.



Moving castings from molds to cleaning room, Michigan regularly carries 1,000 to 1,500 lbs per load. Rig also transports such bagged materials as clay, pitch, and bentonite around the 50,000 sq ft foundry.

25% more power and weight

Today, each Michigan moves an average of over 100 tons of sand per hour — a figure, Company Vice President Gilbert Mauk says, their two former 14 cu ft tractor shovels "couldn't begin to aproach." The 15 cu ft Michigans unload sand from railroad cars . . . transport sand from bins to muller and from muller to molders . . . windrow used sand at the molders, and carry it to stations. Their extra weight and power — 25% more than Marion Foundry's former loaders — help heap buckets to *over 100% of rated capacity!*

Eliminate broken axle problem

While output has gone up, downtime has decreased to practically nothing. Broken axles and drive-wheel suspensions have become a problem of the past. Hydraulic troubles have been stopped. A simple maintenance program—with daily cleaning of breathers, oiling and greasing—has even eliminated most of the short delays.

Available on low-cost lease plan

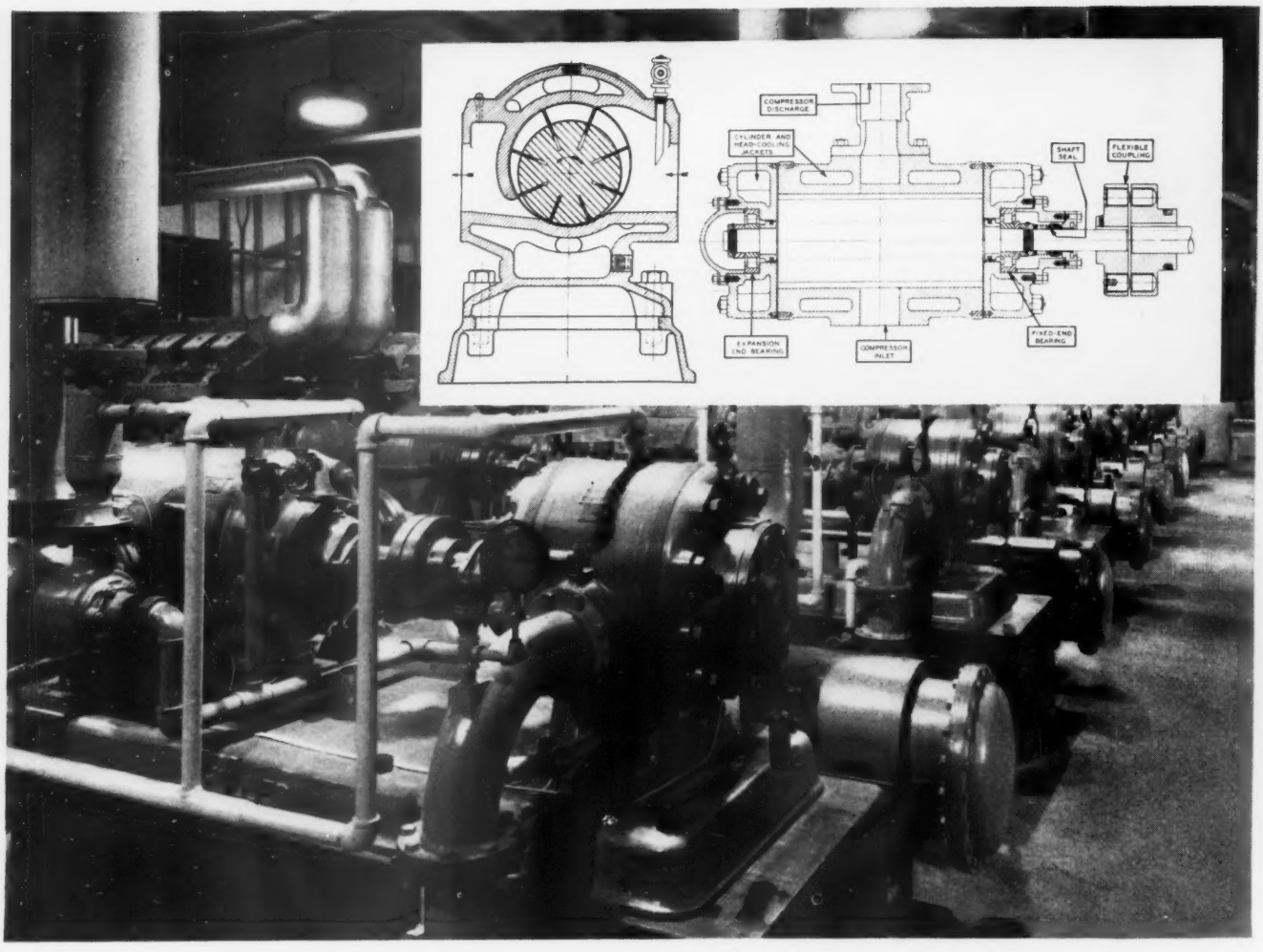
This excellent efficiency, coupled with Marion Foundry's fine maintenance program, *proves* the new Michigan Model 12B Tractor Shovels have what it takes to deliver trouble-free service. For proof, see a Model 12B in action *in your own plant!* Let your own operators run it on any task you say. Measure output . . . compare performance . . . then pick the size bucket you need. Five sizes now available: 6, 10, 15 (standard), 20, and 27 cubic feet. Choose the finance plan best suited to your investment program, too—including the popular Michigan Lease-Purchase Plan which lets you put one or more Michigans in your plant without laying out a penny of capital.

Michigan is a registered trade-mark of

CLARK EQUIPMENT COMPANY
Construction Machinery Division
2475 Pipestone Road
Benton Harbor 42, Michigan

CLARK® EQUIPMENT

Circle 631 on Inquiry Card—Page 219



HERE ARE 7 FULLER ROTARY COMPRESSORS

. . . in *any* quantity they are an investment in dependability

The wide and continuing acceptance of the Fuller Rotary Compressor in industry is based on a number of unique design features, eminently suited for day in and day out operation in any rugged situation. Indoors or out, its trouble-free operation makes for minimum maintenance and operating costs.

There are 8 good reasons why the Fuller Rotary Compressor enjoys such widespread use—they may easily serve as reasons why your next compressors should be Fuller Rotaries.

1. SIMPLICITY—Elimination of compressor valves, crankshafts, pistons and other moving parts greatly reduces the need for attention, adjustment and replacement. 2. PULSATION-FREE FLOW—Rotary compression eliminates pressure fluctuations and simplifies metering problems. 3. SUSTAINED PERFORMANCE—Blades are held out by centrifugal force, automatically compensating for wear, thus maintaining new-machine efficiency and capacity. 4. NON-VIBRATING—Rotary principle permits a design completely free of reciprocating parts, avoiding basic cause of vibration.

5. COMPACTNESS—Large capacity in relation to size results in lighter weight. 6. EASE OF INSTALLATION—In smaller sizes, no foundation is needed. Larger units need only concrete slab for foundation. Automatic safety controls are incorporated in package. 7. ECONOMY—Few moving parts of the compressor, and their accessibility, reduce maintenance to the minimum. 8. VERSATILITY—Unit can be operated at various conditions. Capacity variation of 50% can be obtained by change of speed with engine, turbine, or two-speed motor drives.

We'd like to send you fully-descriptive Fuller Compressor literature. It's yours for the asking.

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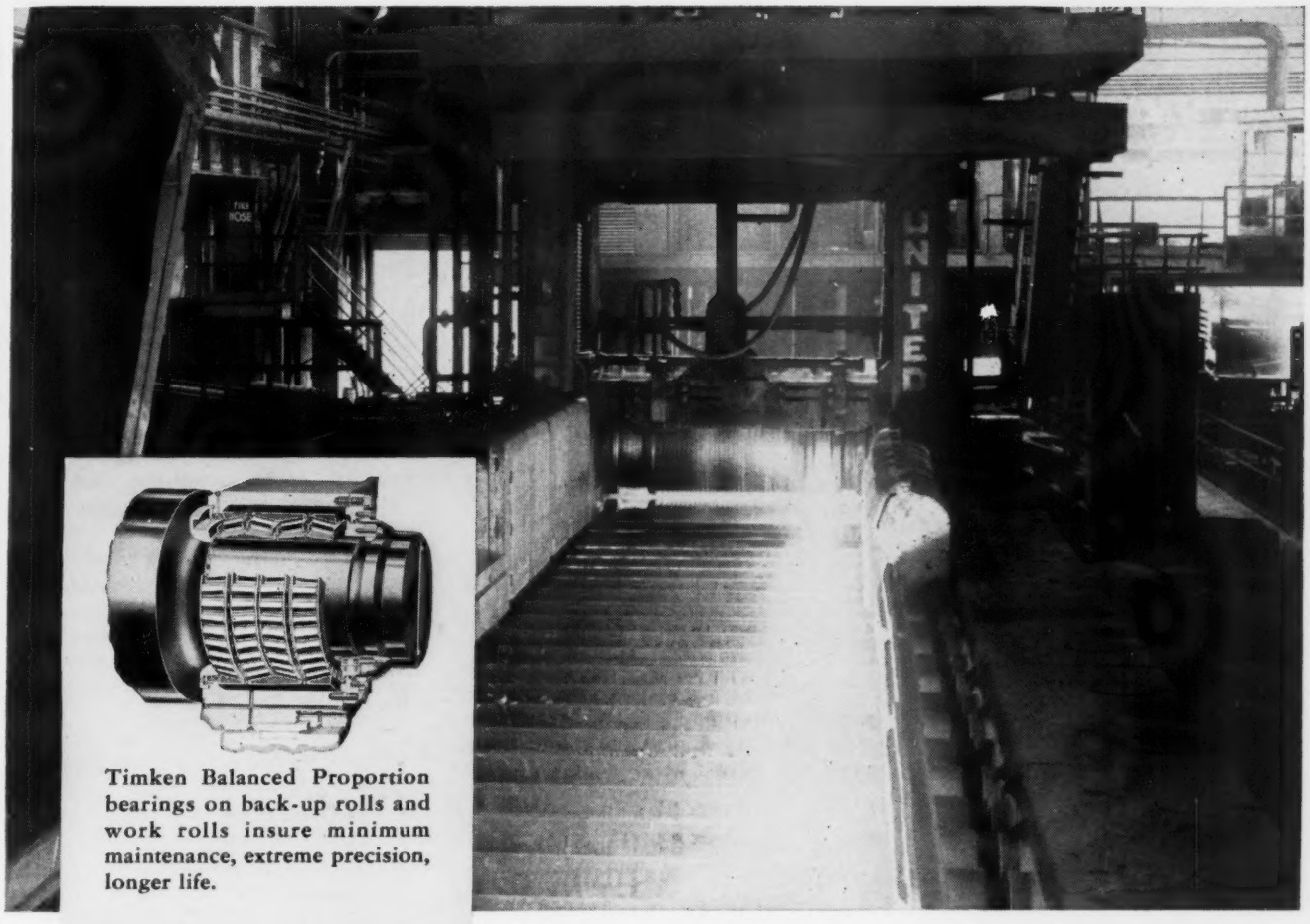
PIONEERS OF HIGH-EFFICIENCY VANE TYPE ROTARY COMPRESSORS SINCE 1930



Timken Balanced Proportion bearings on back-up rolls and work rolls insure minimum maintenance, extreme precision, longer life.

2-high bloom and slab mill starts faster, drives easier on TIMKEN® balanced proportion bearings

WITH the roll necks on this 2-high bloom and slab mill—built by United Engineering & Foundry Company for Pittsburgh Steel's Monessen, Pa., plant—mounted on Timken® balanced proportion bearings, friction is practically eliminated. This means lower starting resistance, faster acceleration, easier roll drive and higher rolling speeds. And because the balanced proportion design of Timken bearings permits larger diameter roll necks with no increase in bearing O.D., roll neck strength is increased up to 60%—load ratings up to 40%.

No special thrust bearings are needed; Timken bearings take radial and thrust loads in any combination. And full line contact between the rollers and races of Timken bearings gives them extra load-carrying capacity. Complicated lubrication systems are eliminated, too; Timken bearings permit simple, economical grease lubrication. Rolls can be changed quickly and easily. Wear is greatly reduced, long life is assured. Timken bearings are designed geometrically to *roll true* . . . and are precision-manufactured, under the most rigid quality controls, to conform to their design. Timken bearings show lowest cost per ton of steel rolled.

Always specify Timken balanced proportion roll neck bearings. For full details, consult our roll neck specialists. Write to: The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.

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Circle 634 on Inquiry Card—Page 219

Readers' Comment

Zirconium in Cast Iron

TO THE EDITORS:

I wonder if I might obtain tear sheets or a reprint of the article, "Zirconium in Cast Iron" by E. A. Brandler which appeared on pages 100-103, June 1956 issue?

Please convey my compliments to the author for his interesting and enlightening paper.

FRANK M. STEARN
Development Engineer
Titanium Alloy Mfg. Div.
National Lead Co.
715 *Mifflin St.*
Lebanon, Pa.

* * *

Best Read Publication

TO THE EDITORS:

FOUNDRY is the best read publication around Pelton, and has been for years; we even read the editorials. I'm sure it will be that way long into the future.

C. E. STULL
Vice President
Pelton Steel Casting Co.
Milwaukee 7, Wis.

* * *

Casting Standards To Rise

TO THE EDITORS:

I feel impelled to write you regarding the excellence of your July issue. True it has articles from three friends of mine, Harry St. John, Howard Taylor and Robert Colton, all of whose contributions are both practical and reliable.

The article on "Steel Castings for Aircraft" should be considered as including aluminum and magnesium. I am convinced that along these latter lines lies a field of much profit for those who will tackle it. I also agree that sooner or later the standards of all buyers in bronze, light metals and the ferrous alloys will be steadily raised, and it behooves the foundry industry to be ready beforehand.

HAROLD J. ROAST
Bronze Foundry Consultant
140 *Grosvenor Ave.*
Ottawa 1, Ont., Canada

* * *

A New Defect Cause

TO THE EDITORS:

We wonder if the good folk in the United States know of "Marmite Jars," a white ceramic jar in which a food company sells its product under that proprietary name.

In Australia these jars are extremely well known.

A salesman for a company marketing bentonite from U.S.A. was asked by a steel foundry foreman for his opinion of what was the cause of "Amoeba-like craters of varying shapes in steel castings, with ceramic material in the craters" (FOUNDRY, July 1956, p. 211 in report of Steel Division session at AFS Atlantic City convention).

After a great deal of unsuccessful experiment by the foreman at the suggestion of the salesman, the salesman finally jokingly suggested the problem could easily be cured by "eliminating the 'Marmite Jars' from the scrap."

So the Australian version of "Snotters" has become "Marmite Jars."

They seem to come and go. We wonder if the cycle coincides with each shipment of U.S.A. bentonite or the incidence of Marmite Jars in the scrap.

K. R. ELLIS
Manager
Davies & Baird Pty. Ltd.
15 *Brunswick Rd.*
Brunswick N. 10
Melbourne, Australia

* * *

Coated Sand Use Successful

TO THE EDITORS:

It is quite some time since I last wrote you and . . . I think you will recall if I mentioned that I was oriented on shell molding by you at the time of my visit to your country in January, 1953.

Again, some time later, our correspondence in December, 1953, and in March, 1955, relating to resin-coated sands was very helpful and beneficial.

We are exceedingly pleased in letting you know that we finally have succeeded in getting the operation of shell molding with coated sand to run on the track. Taking into consideration the future development of our shell-mold operation, we have reached the conclusion that our present facilities for it will not suffice and therefore have been pressed to consider the construction of a new full-scale shellmold shop to meet the on-coming situation.

Of course, the details are not yet on the blueprint but, as a plan, we are contemplating building a shop of approximately 2½ acres of floor space capable of turning out 500 tons of cast iron and 400 tons of cast steel monthly.

TOKINOSUKE MURAO
Managing Director
Toyokogyo Co. Ltd.
Hiroshima, Japan

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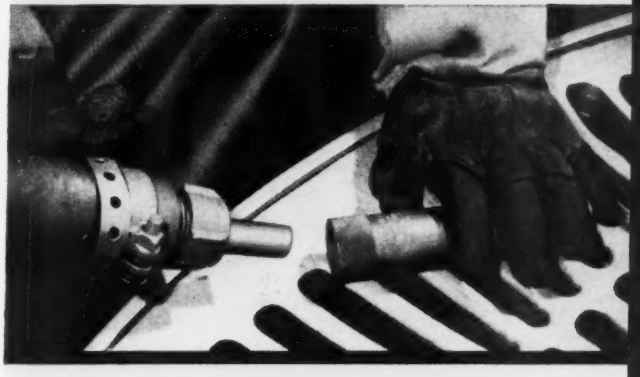
or small ones, too! . . . . .



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Heavy rolled steel sand flanges with square corners and full-width bearing. Partings accurately machined . . . not just surface ground, but planed to an accuracy of .005". And there's plenty of metal left for re-machining, if necessary.

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Can Small Shops Survive ?

Are the days of the small foundry numbered? Is it one of those businesses which certain viewers-with-alarm predict will find it increasingly difficult to compete with larger companies?

An election year usually finds the small businessman a popular figure. This is only natural because there are so many of him. When it is realized that probably more than half of the approximately 4¼ million individual businesses in operation have fewer than five employees each, the special attention the little fellow receives from the politician is to be expected.

This solicitude for small business recently has pointed to the numerous mergers and growing number of business failures. Actually, the number of failures would be expected to increase because business population has grown by more than a million since the war.

Mortality in the foundry industry has been relatively high for a number of years. Since 1946 nearly 2500 foundries have discontinued operations or been merged. During the same period 2300 new foundries have started in business. Small companies predominated both groups. Today just about half of all foundries have fewer than 20 employees.

While figures are not available to prove it, the portion of total castings production accounted for by the small foundry today apparently is less than in the past. The number of foundries in the United States has increased only 10 to 15 per cent during the last 20 years, but output has expanded several fold. Moreover, the percentage of total castings production supplied by captive foundries—most of them large shops—has been growing for the last decade.

Despite the concern—feigned or genuine—about the small manufacturer, the small foundry cannot be erased from the important place it occupies in the industrial picture. It has a special service to offer in its flexibility of operations for accommodating small, rush orders in both good and slow times. But it must recognize its limitations when tempted to seek the sort of business which the larger competitor can handle more economically.

At the same time, the small foundry must recognize the necessity of keeping pace with the advanced technology needed to meet quality demands of consumers. It must make up by ingenuity and know-how what it lacks in specialized equipment.

Uniformly high product quality is a requisite for progress in the foundry industry, and today's competition among various engineering materials is no respecter of the size of the producer.

William G. Reed
Managing Editor

Modern Practice Typified by

New Gray Iron Foundry

Advances in metallurgy and equipment design emphasized the growing obsolescence of the Bullard Co.'s old foundry. Its new $7-million plant provides increased capacity, improved working conditions, higher quality castings and lower costs

By WILLIAM G. GUDE
Managing Editor

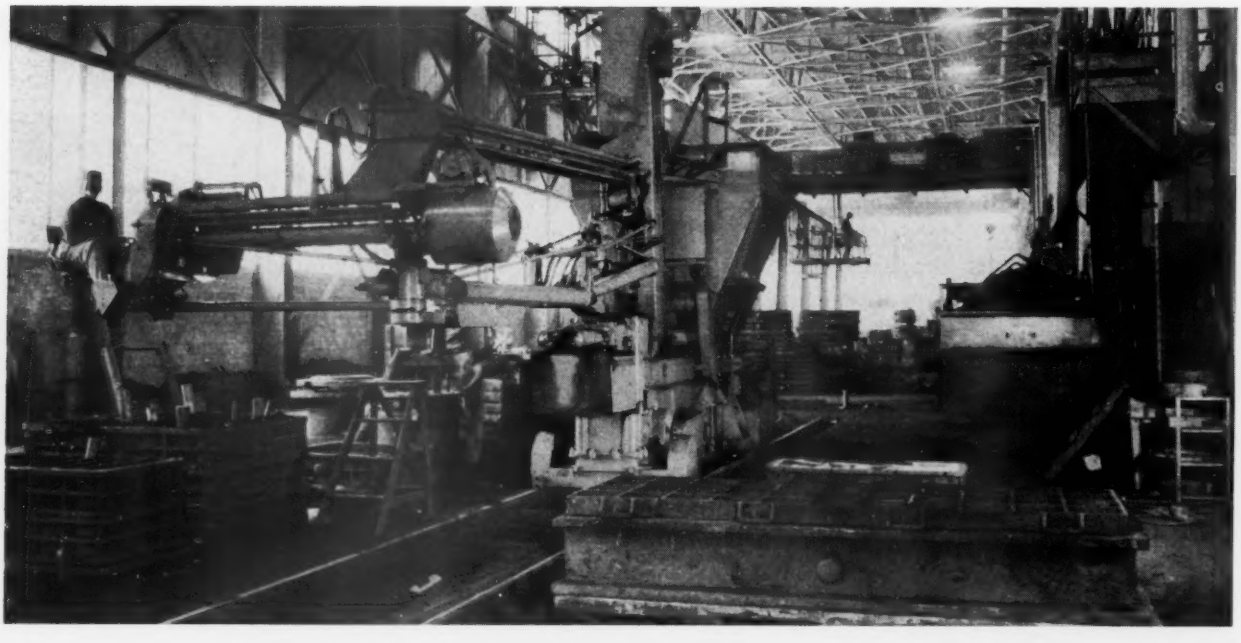
IMPROVEMENTS made in foundry methods and equipment during recent years are typified by the new $7 million gray iron foundry completed a short time ago by the Bullard Co. in the Black Rock section of Bridgeport and Fairfield, Conn. It is one of the country's largest and most modern heavy jobbing type foundries.

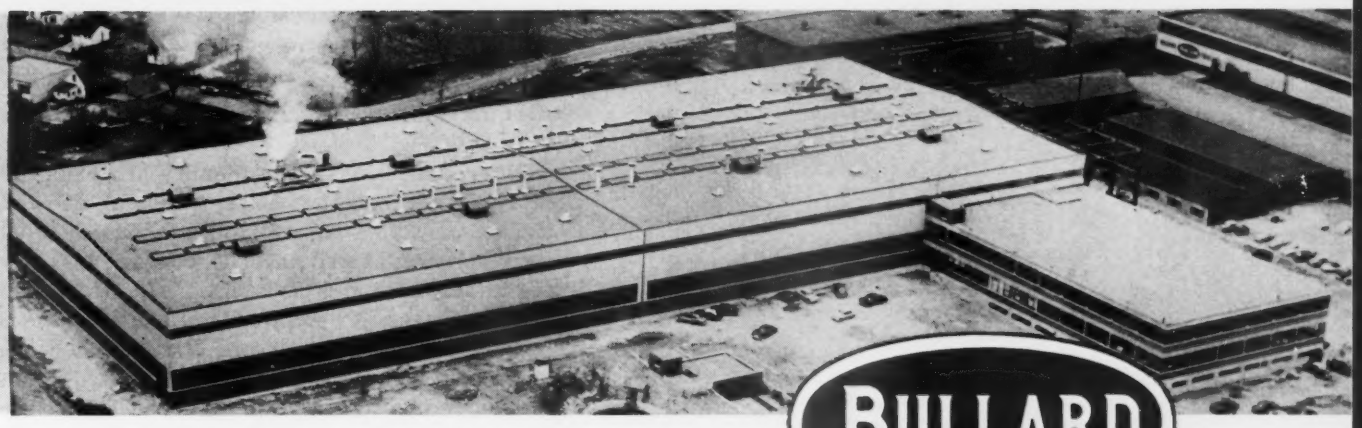
This 76-year-old machine tool builder has produced its own iron castings for many years. Recently, however, it realized that it had outgrown its old foundry, which had been built when the company moved to its present location shortly after World War I. A new line of machine tools introduced last year requires large castings which the old foundry could not handle. Moreover, total foundry capacity was inadequate, and operating efficiency and working conditions left something to be desired if judged by modern standards.

These deficiencies have been overcome by the large, clean and airy foundry which now supplies the castings. Melting capacity is 125 tons a day—about double the former output—and can be expanded further if necessary. This capacity will permit the company to fill outside jobbing business in addition to supplying its own casting needs.

Cleanliness of the plant is made possible by efficient dust control and ventilation systems. A complete change of air in the building is provided every 15 minutes—a movement of 512,000 cubic feet a minute. Incoming air will be heated to 50° during cold weather. A powered vacuum sweeper keeps the concrete gangways clean. Good illumination is provided by a combination of natural and artificial lighting. Working areas receive 40 foot-

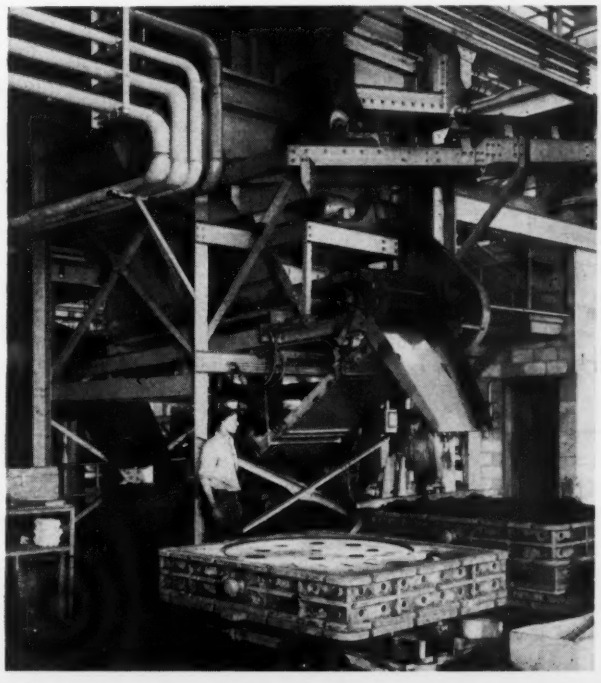
Large mold being rammed on the floor by a motive type sandslinger

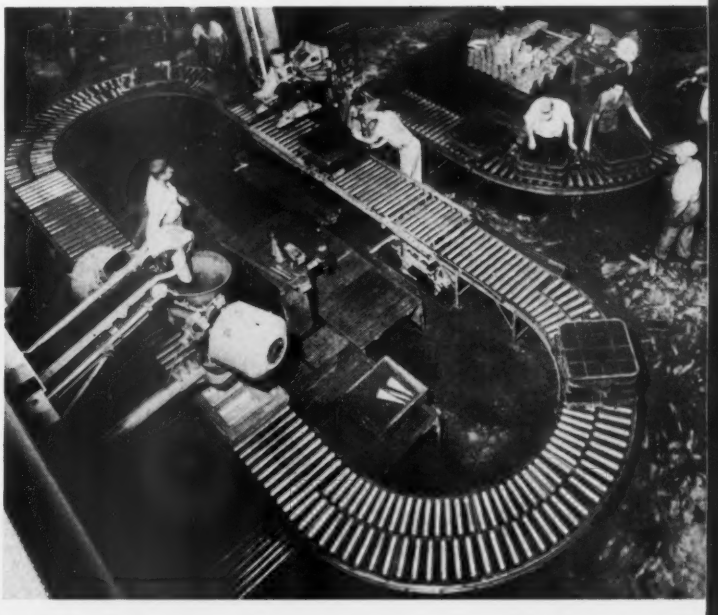




▲ Aerial view of the new foundry at Bridgeport, Conn. Wing houses pattern storage and offices

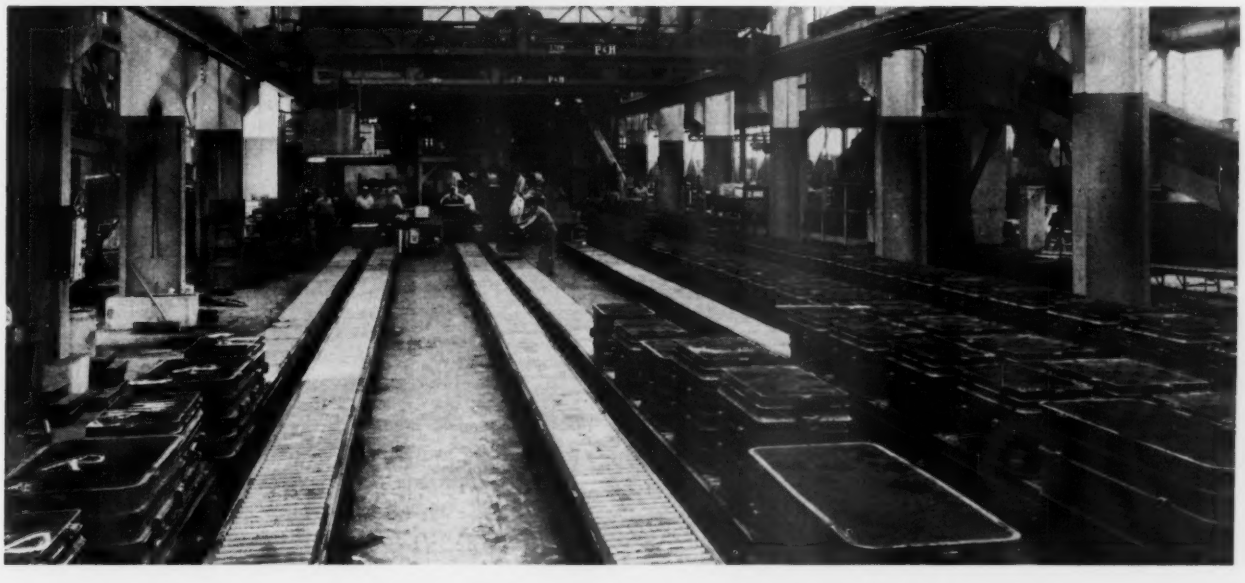
▼ This 10,000-lb rollover molding machine, used for large molds, receives sand from overhead

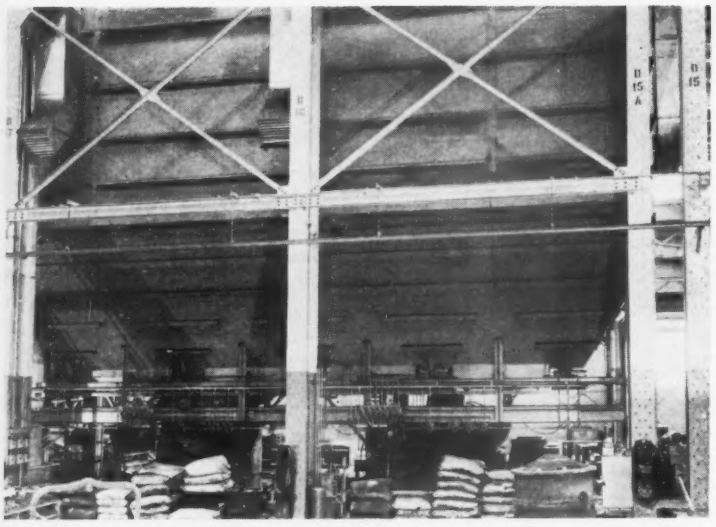




▲ Smaller molds are produced on a roller conveyor loop by stationary slinger and rollover machine

▼ These roller conveyor lines are fed molds from the loop. Molds are poured while on the lines





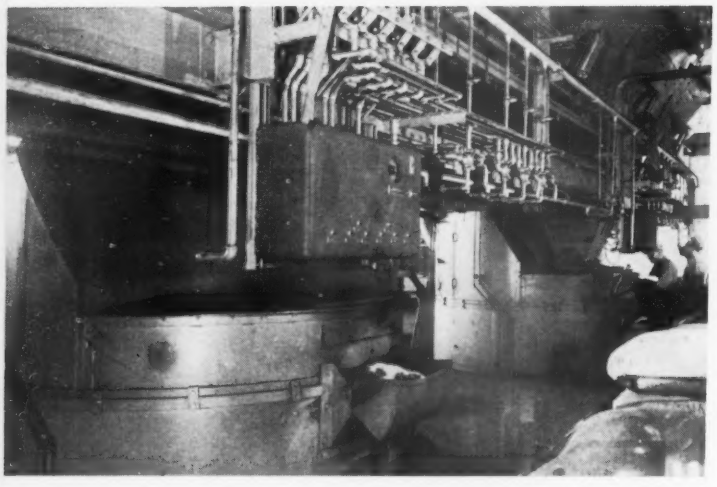
This preparation plant supplies sand for large castings. The system contains 700 tons of sand

candles or more of illumination; storage areas 20 or less.

Foundry Dimensions—The foundry proper is 240 x 600 ft. Ceiling height is 56 ft. Adjoining one end of the foundry at a right angle is a 120 x 200-ft pattern building, which incorporates the foundry offices and laboratories as well as a pattern shop and pattern storage. A two-story building, it is designed so that in the future a third floor can be added. Because the building is erected on a slope, one end of it now is three stories high. The ground floor includes shower and locker rooms for the approximately 250 employees. These rooms have forced ventilation, with all lockers individually exhausted.

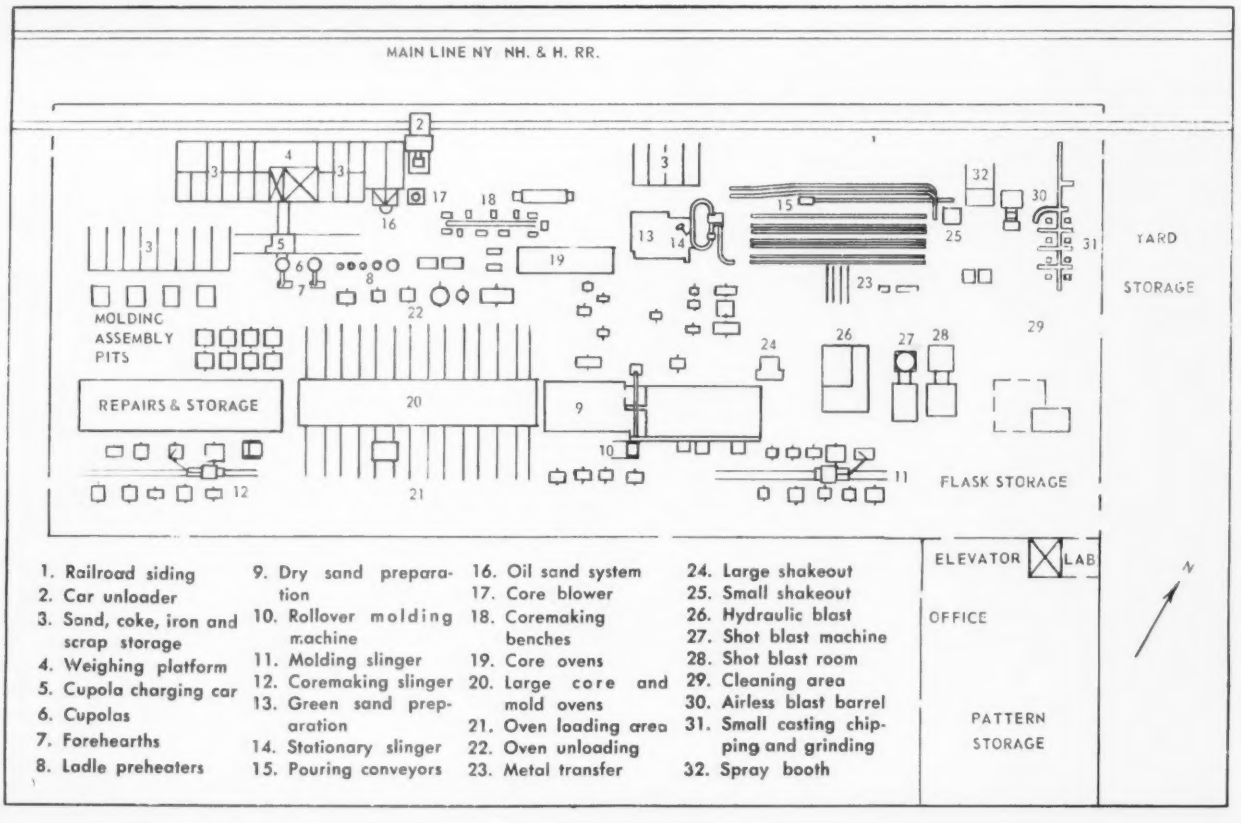
In the design and layout of the foundry considerable study was given to the problem of providing maximum efficiency in material handling. Results achieved have been an important factor in reducing operating costs compared with those for the old foundry.

The large size of many of the castings produced requires extensive use of cranes in transporting hot metal, castings, flasks, etc. A total of 17 cranes are installed, ranging from 3 to 50 ton capacity. Crane capacity sets the limit on maximum weight



Close-up view of the two 3000-lb capacity mixers located at the large sand preparation plant

Sketch showing arrangement of principal foundry departments. The main building is 240 x 600 ft



1. Railroad siding
2. Car unloader
3. Sand, coke, iron and scrap storage
4. Weighing platform
5. Cupola charging car
6. Cupolas
7. Forehearths
8. Ladle preheaters
9. Dry sand preparation
10. Rollover molding machine
11. Molding slinger
12. Coremaking slinger
13. Green sand preparation
14. Stationary slinger
15. Pouring conveyors
16. Oil sand system
17. Core blower
18. Coremaking benches
19. Core ovens
20. Large core and mold ovens
21. Oven loading area
22. Oven unloading
23. Metal transfer
24. Large shakeout
25. Small shakeout
26. Hydraulic blast
27. Shot blast machine
28. Shot blast room
29. Cleaning area
30. Airless blast barrel
31. Small casting chipping and grinding
32. Spray booth

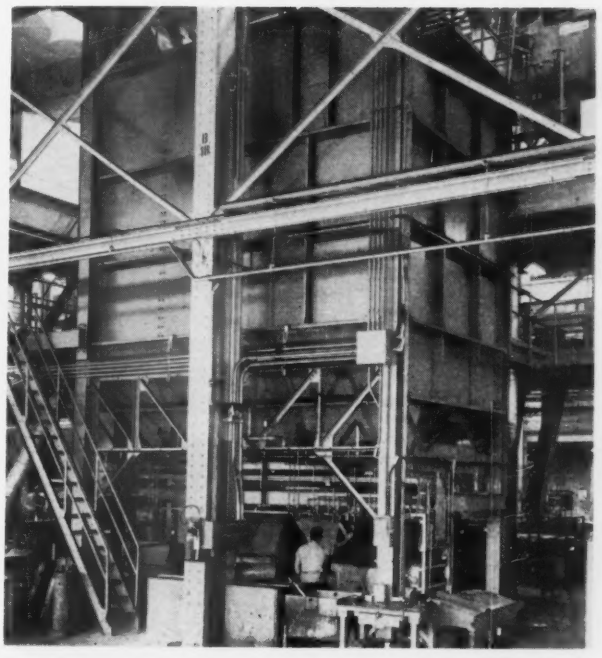
of castings that can be made, although the building is designed to take 75-ton cranes should they be needed.

Areas in which the various operations are performed are arranged in parallel bays to prevent interference between the travel of the cranes—a difficulty encountered in the old foundry, which was long and narrow. To permit simultaneous pouring in one bay and transfer of hot metal to an adjoining bay, a side wall crane is provided which can travel from the cupolas and pass under the overhead pouring cranes.

Raw Materials Under Roof—A railroad siding which passes through the foundry at its north side, as shown in the accompanying layout sketch, brings in raw materials to storage bins. Storage capacity is provided for 1000 tons each of pig iron and scrap and 28 carloads of sand.

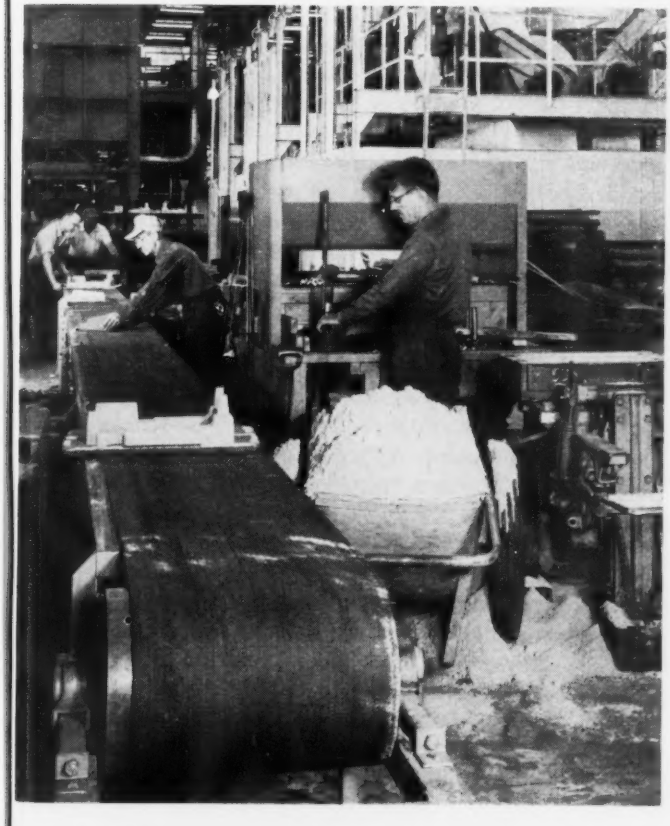
Coke, sand and limestone are dumped from drop-bottom gondola cars at an unloading station into a special bucket located in a pit. The bucket, equipped with a drop bottom, then is moved by crane to the storage bins. A water spray holds down the dust when coke is unloaded. Pig iron and scrap are unloaded from railroad cars by a magnet-equipped crane directly into storage.

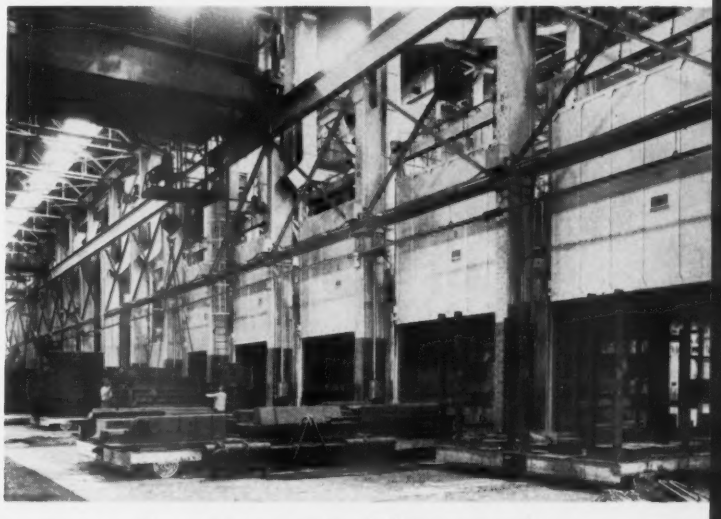
In making up cupola charges, pig iron and scrap are dropped by crane into a charging bucket located beneath the weighing platform. A charge for the regular grade of iron consists of 25 per cent pig iron, 25 per cent steel and 50 per cent scrap. Charges are weighed carefully, the weights being recorded on automatic print-weigh scales. Next the bucket is moved over a track to coke and



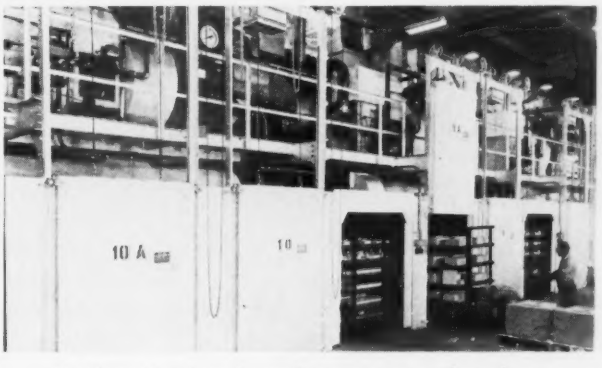
Separate system is provided to supply sand for molding smaller castings—up to 200 lb

View in the coreroom showing belt conveyor used to move the cores to ovens for baking

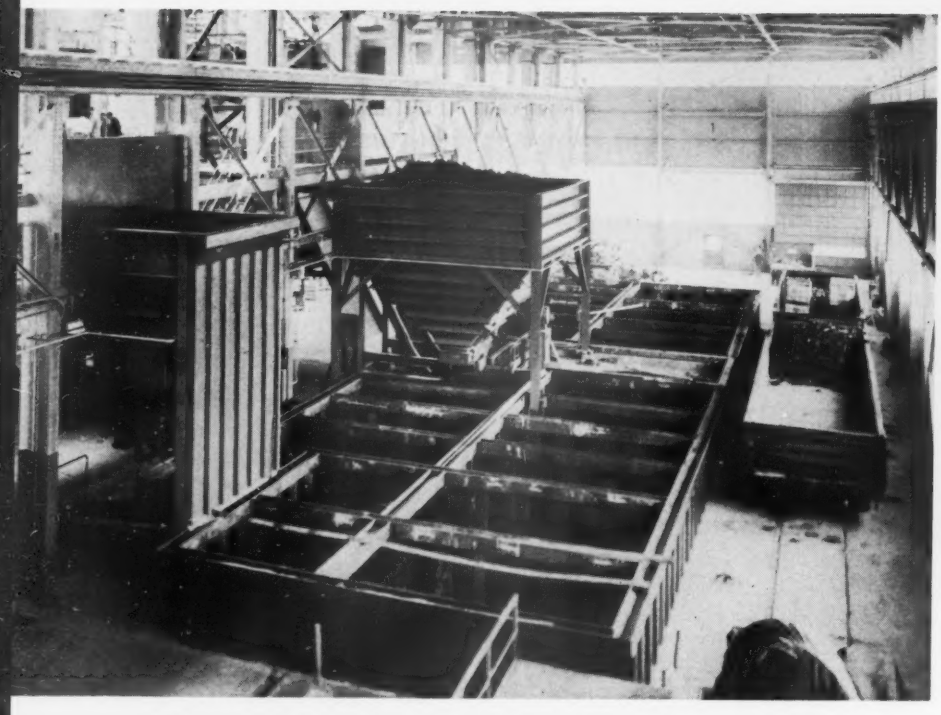




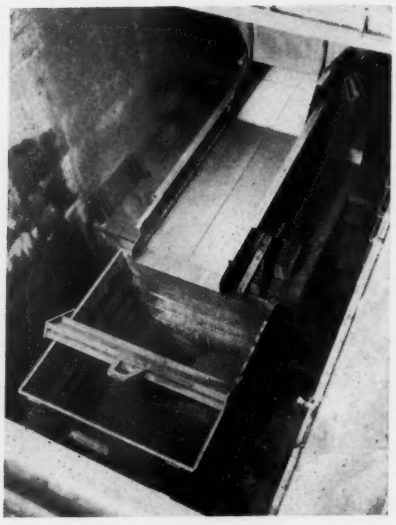
Large molds and cores are loaded on cars and pushed into these ovens for drying and baking



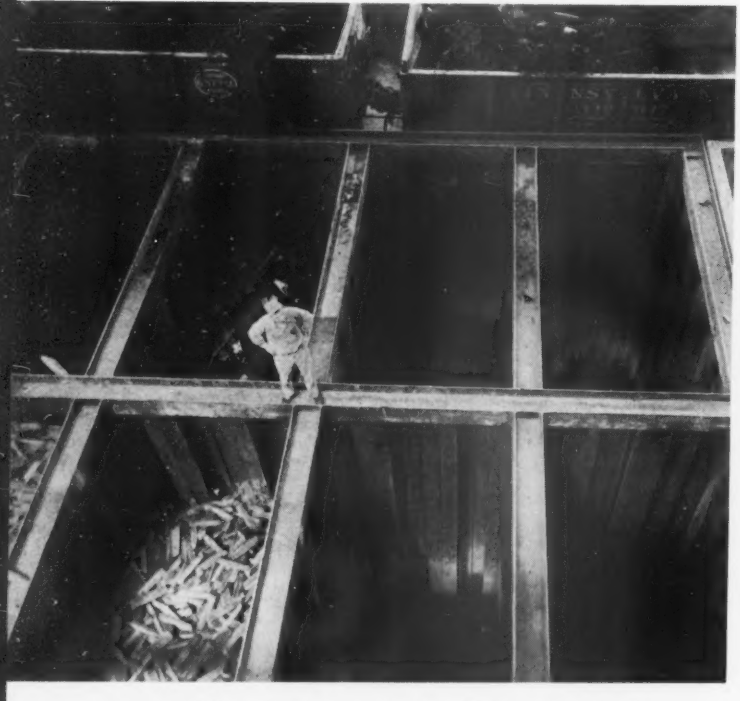
Medium-sized and smaller cores are placed on racks and baked in the six batch type ovens



Raw material storage bins for pig iron, scrap, sand and coke are located inside the foundry



Unloading station for coke, sand and limestone. Material is fed by vibrating conveyor from gondolas to bucket located in pit. A crane transfers bucket to bins



Storage bins can hold 1000 tons each of pig iron and scrap, 28 carloads of sand

limestone hoppers from which the required amounts of those materials are automatically fed by vibrating conveyors. The bucket then is raised by skip hoist to the charging floor.

The foundry has two No. 8 cupolas lined to 60 in. which are operated on alternate days. A transfer car on the charging floor takes the charging bucket as it arrives there, moves it to the cupola in operation and extends it through the charging door to drop its contents.

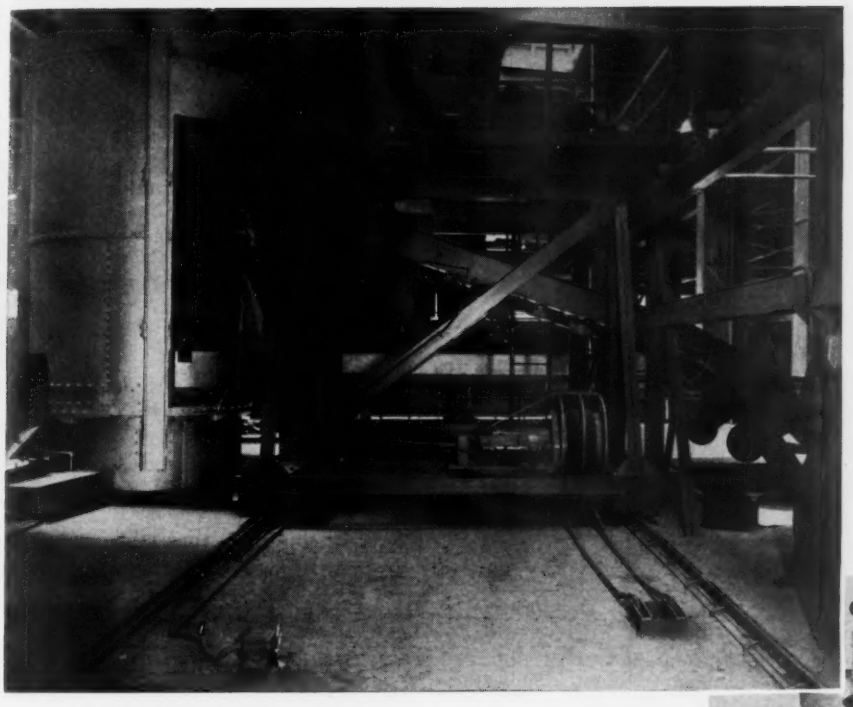
The cupolas, of front slagging type, are equipped with gas burners to ignite unburned gases given off during the early part of the furnace run. Frequency of charge additions to the cupola is regulated by a stock line indicator.

Metal is tapped continuously from the cupola into a forehearth, and slag is discharged into a stream of water and carried by an underfloor sluiceway outside the plant. This central sluicing system, recirculating 1000 gallons of water a minute, also is the discharge medium for the wet type dust collectors on top of the cupolas and the various units which collect dust generated by the shakeouts, blasting machines and sand systems.

From the forehearths, metal is transferred to ladles either for pouring large molds by overhead crane in a center bay or for movement by the side wall travel crane to another area where smaller molds are set out on roller conveyors for pouring.

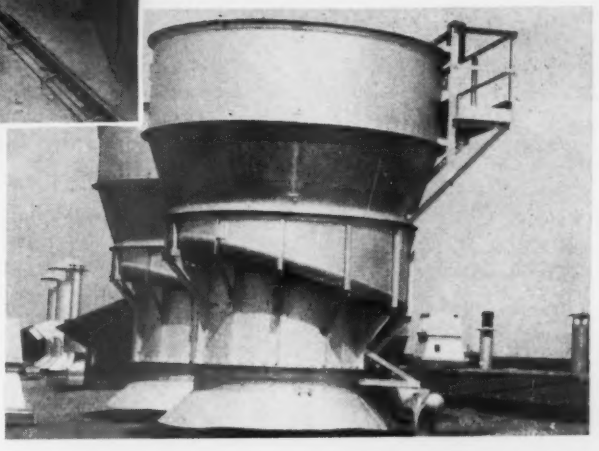
Molding—Large molds are rammed by a motive type sandslinger and a 10,000-lb rollover molding machine. Another motive slinger prepares large black cores. As shown in the layout sketch, heavy molding and coremaking is done in the south bay. This area also includes a sand preparation plant and large car type ovens for drying the molds and baking cores.

Base sand used in this section for both molds and black cores is a natural bonded type and is prepared by two 3000-lb capacity mixers. The system contains about 700 tons of sand. From the mixers the prepared sand is distributed by belt conveyor to the rollover machine and to portable hoppers for mounting on the two sandslingers. Sand moisture is controlled carefully, additions being made by an automatic device which adjusts the amount of water added according to the temperature and moisture content of the sand as it enters the mixer. The sand is tested hourly.



Cupola charges are elevated by skip hoist to this transfer car. The car travels on a track and moves bucket to the one of two cupolas in service

Wet type dust collectors for the two cupolas. Fly ash is washed into the central sluicing system, which carries it from the plant for disposal



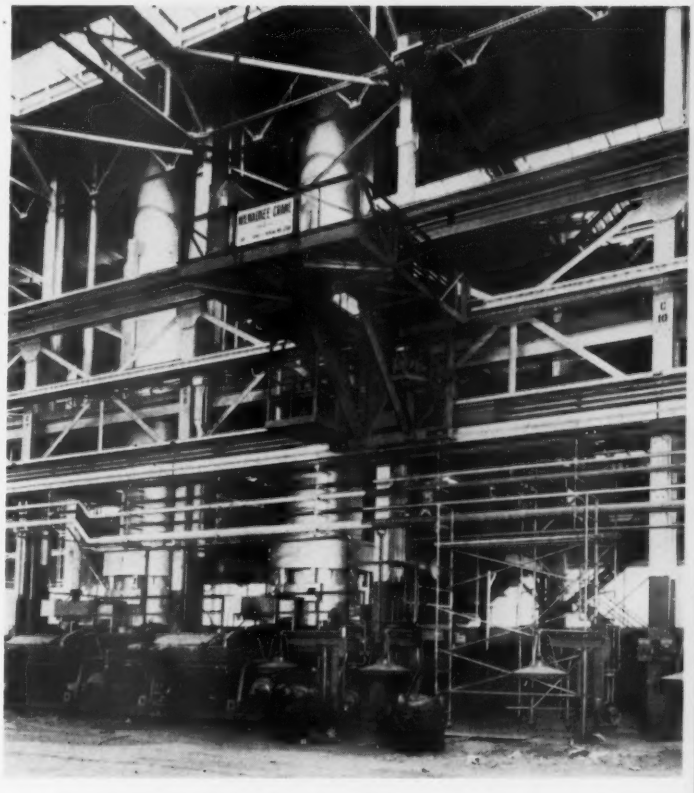
Molds and large cores are loaded on cars in the south bay and pushed into gas-fired ovens for drying and baking. The cars are moved from the opposite sides of the ovens for unloading in the central bay, where cores are set and the molds closed and poured. Some of the larger molds are set in pits to provide a convenient height for workers in finishing the molds and setting cores.

A department for making small oil-sand cores is located adjacent to the central pouring floor. These cores are made by a core blower, at benches or by jolt rollover machines, and are carried by belt conveyor to racks for baking in six batch type ovens. A redry oven is also provided.

A separate department makes green sand molds for smaller castings—up to 200 lb. It uses a stationary type sandslinger, and molds are set out on roller conveyors for pouring. About 15 pattern changes are made here daily. The green sand molding section has its separate sand system, using two 1-ton capacity mixers.

Poured molds are moved by crane to the shakeouts. A separate shakeout is provided for small and large molds, and both are well hooded and ventilated to prevent dispersion of dust. The larger unit has a 10 x 12-ft deck. Sand that falls through the grid is carried away by belt conveyor below the floor and is passed over magnetic separators and screens before being returned to the sand preparation plants. Flasks are returned to the molding floor or storage, and castings move on to the cleaning department, which occupies a large part of the eastern end of the building.

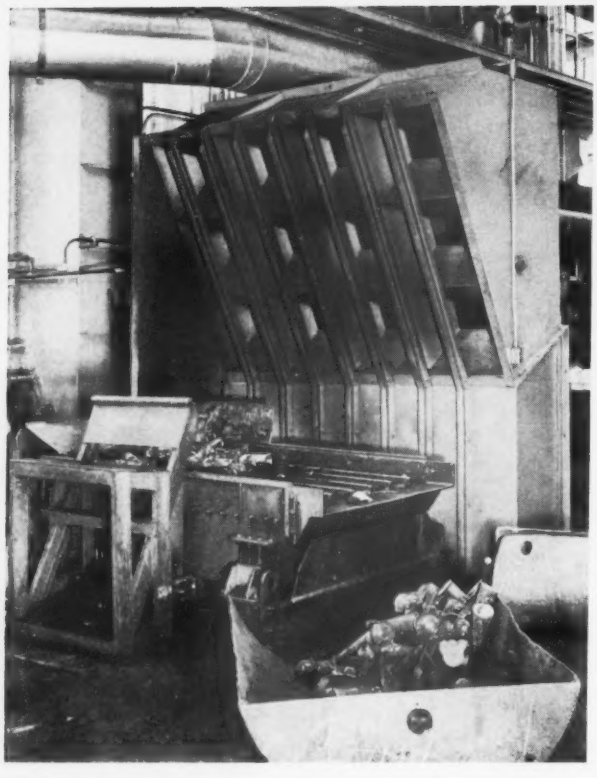
Cleaning—Cleaning equipment includes a variety of types, some of which is extra large to accommodate big castings. A hydraulic blast room, 12 x 20 ft, knocks out cores and washes off adhering sand from large castings under the impetus of its



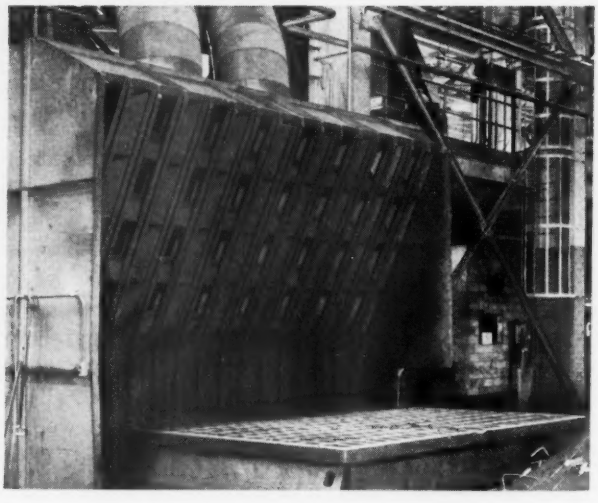
Two 60-in.-diam, front-slagging cupolas are tapped continuously into heated forehearths

Overhead cranes pour molds set out on the floor. A total of 17 cranes are installed

Large shakeout used for bigger castings is ventilated to remove dust and fumes



This ventilated shakeout handles smaller molds



2000-psi pressure water stream flowing at a rate of 150 gallons a minute. It is operated by remote controls from outside the room. Another large cleaning unit is a car type, airless blast room for shot blasting. Small castings are cleaned in an airless blast barrel. Chipping and grinding operations complete the finishing of castings before they are sent to a spray booth for painting.

Waste Disposal—Fly ash, dust, sand and slag carried by the central sluicing system flows outside the building to a classifier and settling basin —shown in the center foreground of the accompanying over-all view of the plant. The classifier takes out the heavy sludge and feeds it into large buckets which are hauled away by a special truck and dumped. Remaining water is pumped into the basin where a flocculant is added to assist the fine material to settle out. These solids then are removed. Clean water is recirculated through the mill water system.

Quality Control—Close control is exercised by the foundry over the many variables which influence quality of the castings. These variables are concerned primarily with sand and metal. Chill tests of the iron are made frequently at the cupola, and six chemical analyses of the metal are made each four hours for a check on carbon, silicon, sulphur and manganese.

The foundry generally melts two grades of iron —a regular grade of 30,000 to 35,000 psi tensile and a smaller tonnage of a 35,000 to 40,000 psi so-called steel grade. Large charts are maintained to record daily variations in chemical composition of the iron, along with the trend in percentage of scrap castings. Maximum and minimum limits

Operator directs action of the hydraulic blast unit from convenient position outside the room

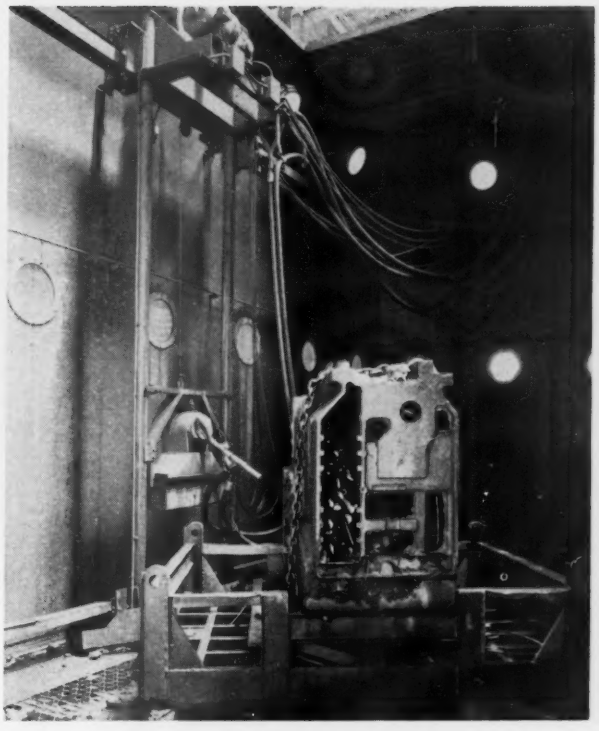
have been established to indicate when any composition is out of control. For the regular grade, this average analysis is sought: Total carbon 3.30-3.45, silicon 1.75, carbon equivalent 3.95 and sulphur 0.115.

Similar charts are maintained for sand. Variations are recorded on moisture, compressive and tensile strengths, permeability and fineness.

Photos courtesy of the Bullard Co., C. O. Bartlett & Snow Co., Foundry Equipment Co., Hydro-Blast, and National Engineering Co.

Suppliers of Major Equipment for the Bullard Foundry

American Air Filter Co.—Dust collectors
C. O. Bartlett & Snow Co.—General engineering and sand handling equipment
Beardsley & Piper Division, Pettibone Mulliken Corp.—Sandslingers
Dorr Co.—Classifier
Foundry Equipment Co.—Mold and core ovens
Hartley Controls Corp.—Sand moisture control
Herman Pneumatic Machine Co.—Rollover machines



Blast nozzle can be moved vertically or horizontally. Pressure of water stream is 2000 psi

Hydro-Blast—Hydraulic blast room
Milwaukee Crane & Service Co.—Cranes
Modern Equipment Co.—Cupolas and charging equipment
National Engineering Co.—Sand mixers
Pangborn Corp.—Shot blast room, dust wetters and collectors
San-Blo Division, Federal Foundry Supply Co.—Core blower
Claude B. Schneible Co.—Cupola dust arrestors
Simplicity Engineering Co.—Shakeouts, screens, conveyors
Wheelabrator Corp.—Airless blast room and barrel
Whiting Corp.—Forehearths, ladles and ladle heaters

Heavy solids removed from sluice water by the classifier are raked into buckets for dumping

Gating and Risering in The Brass Foundry

Continuing his series on The Brass Foundry, Mr. St. John this month turns to the important topic of gating and risering. This article is the fifteenth in the series on various phases of foundry practice

By HARRY ST. JOHN
Foundry Consultant

RUNNERS, gates and risers are the channels and reservoirs which carry molten metal to the casting cavities in the mold and continue to do so until the cavities are completely filled with solid metal. If they fail to perform this function perfectly, a variety of defects results—misruns, cold shuts, shrinkage cavities, microshrinkage, dirt inclusions.

In recent years much important work has been done in studying the behavior of metal in the mold. Formulas have been worked out and principles established which have been of great help to foundrymen, particularly in those branches of the industry which deal with quick-freezing alloys such as the ferrous metals and the light alloys.

The long freezing range of the red brasses and tin bronzes introduces more serious problems, and here less progress has been accomplished. Even in those cases where formulas are most applicable, good judgment based on experience is still essential. There seems no likelihood that the practice of trial and error will ever be completely eliminated. Fred Sefing has well said: "There are no hard and fast rules that can be applied to the design of gates and feeders which will apply to all metals or to any one metal under all circumstances."

It should be remembered that the production of sound castings is not the foundryman's only goal. He must produce competitively at a profit. Metal used for gates and risers is non-productive and limits the casting yield, as has been discussed in a previous article. (FOUNDRY, January, 1956, page 84.) For the sake of economy the proportion of nonproductive metal must be reduced to the lowest possible point.

For the same reason the use of chills and insulators, or any other device which increases the molding cost, is a last resort, for use only when nothing else will serve. Sometimes also the gating best calculated to produce sound castings results in excessive costs in the cleaning room. In a majority of cases the most economical layout will be a compromise based on good judgment and an accurate knowledge of costs. It is evident too that the design of the casting itself has an important bearing on the proportion of nonproductive metal which must be used.

No Compromise on Soundness—If we define a sound casting as one having no defect which will interfere with its acceptance by the customer, then soundness is our first consideration. Here there can be no compromise. To achieve soundness three basic things must be accomplished:

1. Completely fill the casting cavity with a continuous flow of metal so that there are no misruns and no cold shuts.

2. Provide an adequate feed of fluid metal during solidification so that there are no shrinkage cavities and microshrinkage.

3. Make sure that the metal entering the casting cavity is clean so that there will be no dirt inclusions.

One common cause of dirt inclusions can be cleared up at once. Shifted castings, due to a mismatch between cope and drag, are a familiar foundry defect against which the foundryman is

naturally alert because such castings are unacceptable. Often, however, he pays less attention to a mismatch of runners, gates or sprues. Although these mismatches do not directly affect the castings, they are a prolific source of dirt inclusions. Fig. 1 illustrates a mismatched runner (A) and a

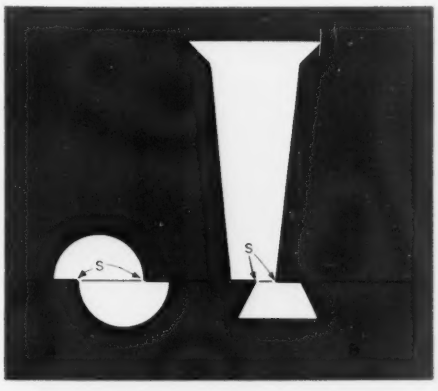


Fig. 1—*A* is mismatched runner; *B* is mismatched sprue. In each case, *S* is a sharp edge of sand

mismatched sprue (B). In each case *S* indicates a sharp edge of sand, some of which is almost certain to wash into the stream of metal and perhaps be carried into the castings.

If there is no shift in the castings, the runner shift is presumably due to a mismatch in the pattern and can readily be corrected. The difficulty is that this matter is often overlooked and neglected. The mismatched sprue is due to the common practice of cutting the sprue hole by guesswork.

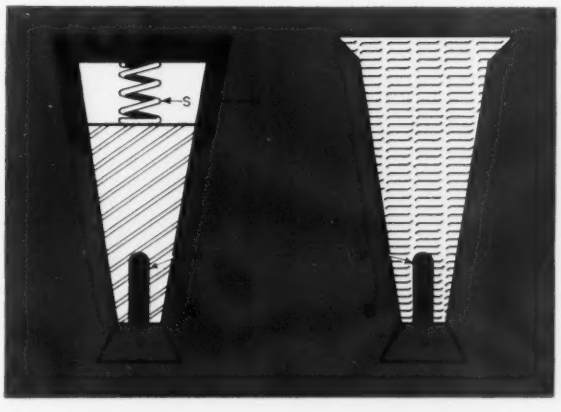


Fig. 2—Use of sprue cutter avoids mismatched sprue. Center pin *P* in drag sprue print *D* locates a steel cutter in diagram *A*. Cutter is loaded with spring *S* enclosed in head *H*. In diagram *B*, the sprue cutter is made of rubber

This difficulty can be avoided by the use of a sprue cutter accurately indexed to match the sprue print in the drag, as illustrated in Fig. 2. The drag sprue print *D* is equipped with a centered pin *P* which locates the sprue cutter. The steel sprue cutter in diagram A is loaded with a spring *S* enclosed in the head *H*. When the mold is pressed the head slides down the shank, returning to full length when the pressure is released.

In diagram B the principle is the same but the sprue cutter is made of rubber, sufficiently rigid to stand alone when placed on the pin, sufficiently flexible to compress with the sand when the mold is pressed.

Another scheme is to attach permanently a sprue cutter to the cope pattern. This practice definitely is not to be recommended because it results in a sprue hole which is larger at the bottom than at the top. Without a draft in this direction the pattern could not be drawn. As will be presently seen it is essential that the sprue hole be considerably larger at the top to avoid suction at the bottom of the sprue when the metal is poured.

Strainer Core Prevents Washing—Still another method of avoiding trouble at the bottom of the sprue hole is by the use of a strainer core as shown in Fig. 3. Here, if the sprue is off center, the falling stream of metal strikes a baked core

Fig. 3—Use of strainer core or ceramic insert C can prevent washing if a sprue is off center

or ceramic insert, instead of an edge of green sand, and washing of sand is unlikely. The strainer core, which will be discussed in more detail later, has other functions and cannot always be used.

For the present we are thinking only of small molds, say 12 x 18, with several castings in each mold. We wish to pour at least 15 molds from a crucible or ladle which will have a maximum capacity of 250 lb. The practice to be followed will be a balance between pouring temperature and liberality of gating. In this relationship there are two schools of thought. One prefers to pour at the lowest possible temperature with a liberal use of gates and risers. This practice results in a large proportion of nonproductive metal and a low casting yield. With labor costs and metal prices what they are, the writer prefers the smallest possible gates and runners with a higher pouring temperature. With rare exceptions there should be no risers. However any gating technique is certain to be a compromise between economy and perfec-

tion of quality, and this goal is adequate.

Metal Should Flow Smoothly—Smoothness of metal flow is an important consideration. Since both silicon and aluminum have a strong tendency to froth and form oxide drosses, turbulence of flow must be avoided at all costs in the pouring of aluminum and silicon bronzes. The gating layout must be such that there are no sudden changes of direction or velocity. Sharp corners are to be avoided, and molds should not be tilted downward from the sprue. The same is true of manganese

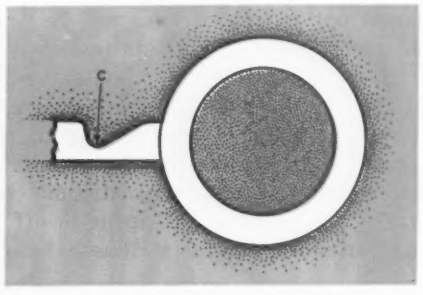


Fig. 4—Choke C in gate slows down metal entering mold cavity and allows air or gas to escape

bronze but in less degree. With the red brasses and bronzes the possibility of turbulence cannot be ignored entirely but the problem is much less serious. These metals can safely be poured downhill and this is an almost universal practice.

Metal entering the mold forces its way by gravity against the back pressure of the air in the cavities and the gases which are formed when hot metal comes in contact with cores and molding sand. Air and other gases can escape only through the porous sand and through any vents which may have been provided. An attempt to fill the mold more rapidly than the gases can escape will result in misruns or porosity due to trapped gas.

Obviously, the permeability of the molding sand is an important factor, as is also the volume of gas given off by the cores. One advantage of the so-called synthetic sands is their lower moisture content, resulting in less steam evolution. Control of the rate of flow is an important means of avoiding these troubles. This control can be accomplished by choking the gates or by the use of a strainer core to choke the flow at the bottom of the sprue.

A choked gate is illustrated in Fig. 4. The choke *C* slows down the metal entering the mold cavity and allows ample time for air and gas to escape. In some instances this is a good method but it does cause turbulence at a critical spot and there is also the danger that the choke will freeze and cut off the flow of metal while the casting is still partially fluid and in need of continued feed.

Usually the preferred place to choke the feed is at the bottom of the sprue, and this can be done best by means of a strainer core, as illustrated in Fig. 3. The degree of choke is governed by the number of holes in the core and by their size. In extreme cases a one-hole core works to best advantage. It is well to keep in stock a variety of cores suited to differing requirements. An incidental advantage of choking the sprue is that it facilitates keeping the sprue hole full during pouring. Any slag or dross which gets into the pouring stream tends to float on top of the sprue. If the pourer is instructed to keep the sprue hole full it is relatively easy for his supervisor to see that this is done. The followup is much more difficult if it is necessary to tell the pourer to pour this job hard, that one easy.

A number of ingenious arrangements have been devised to provide dirt traps in the gating system. These methods add to the proportion of nonproductive metal and are seldom used in making small castings.

Reduced Pressure Causes Trouble—If too much back pressure is bad, even a little reduced pressure is worse. This condition is likely to take place only at the bottom of the sprue and then only if the sprue hole is badly proportioned. Fig. 5 shows what would happen in an untapered sprue hole. Even though the top of the sprue is full the accelerating action of gravity narrows the stream as it falls. Air is drawn into the metal and reduced pressure is set up in the space *R*. If the metal contains zinc, the area of reduced pressure fills with zinc smoke, resulting in zinc worms or smoke holes in the castings.

It is evident that the sprue hole must be tapered to at least the natural taper of the falling stream of metal. The greater the depth of the sprue hole the more pronounced the effect. Even in shallow molds the cross-sectional area at section *T* should be substantially greater than at section *B*. This circumstance explains the previously mentioned undesirability of a sprue cutter permanently attached to the cope pattern.

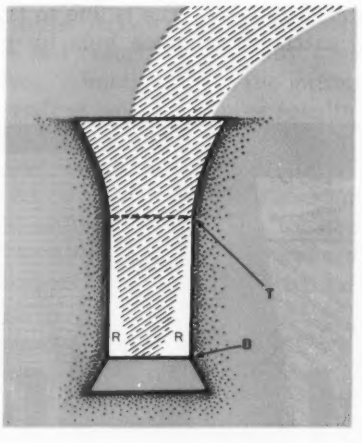


Fig. 5—With untapered sprue hole, air drawn into the metal causes reduced pressure in spaces *R*

A round sprue hole is most convenient and is generally used, but it does have a tendency to set up a whirling action in the metal passing through it, causing turbulence and suction. For this reason a sprue of rectangular cross section sometimes is used. It is a good thing to try when other methods fail.

Sand Has Chilling Effect—A frequent cause of

misruns is the chilling effect of the sand on the first metal to enter the mold. This condition is illustrated in Fig. 6. If the mold is normally tilted downward from *S* to *B*, the first metal to enter the bottom two castings will have had the job of heating the sand for the full length of the runner and will be correspondingly chilled. Misruns are likely to occur at points marked *M*. If the two gates marked *G* are removed entirely the misruns will disappear but the castings will prob-

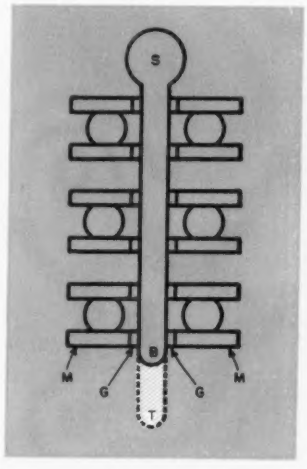


Fig. 6—Sand can chill first metal into mold and cause misruns at points marked *M*. Two gates are *G*; *T* is extension of runner; and *S* and *B* indicate direction mold is tilted

ably have shrinkage cavities because the two remaining gates do not give a sufficient feed. The unused portion of the runner has served as a cold-metal trap.

If there is room in the mold to extend the runner to *T*, as shown by the dotted lines, the misruns can be eliminated without any change in the normal gating. This is one case where an excess of nonproductive metal pays its way.

A cold shut is an incipient misrun. It occurs when two converging surfaces of metal retain sufficient fluidity to come together but are too chilled to coalesce into a continuous structure, thus forming what looks and acts like a crack. Sometimes the gating can be changed so that there are no longer two converging surfaces in a part of the casting remote from the feed. Sometimes it is necessary to fill the mold cavity more rapidly even though other considerations make slow filling preferable. Sometimes the pouring temperature can safely be raised sufficently to correct the difficulty. If everything else fails, it may be necessary to work with fewer pattern pieces on the plate so that a gate can be placed at the point where trouble occurs.

With both misruns and cold shuts there is an important point to bear in mind. The quality of the metal is a factor. If the case history of the casting (see the September article) shows that misruns and cold shuts come in bunches but infrequently, either metal or pouring temperature is at fault and the gating should not be disturbed. It is important also to identify misruns which may be due to trapped gas or a floating core. If good results have ever been obtained with the present gating, one should be slow to change.

Use Circular Cross Section—Whenever possible gates and runners should be nearly circular in cross section because, in proportion to their volume and weight, they will expose least surface to the chilling effect of the mold. As the metal cools, circular gates and runners will provide an inner channel for the feeding of metal longer, with less weight of non-productive metal, than with any other shape. To accomplish this condition, gates and runners will have to be of equal volume to cope and drag.

Many authorities disagree on this point, some maintaining that the runner should always be in the cope, gates in the drag, while some hold to the exact contrary. Actually, in the writer's opinion, both are right and both wrong, depending upon the peculiarities of the casting which is to be gated. On the average, equal gating in cope and drag is entirely satisfactory for most castings. Exceptional cases require exceptional treatment.

In one type of pattern construction equal cope and drag gating cannot be avoided. Fig. 7 shows three types of pattern plate construction. (A) is the familiar matchplate, having in this case the runner in the cope, gates in the drag. (B) is a cope-and-drag pattern where runner and gates are necessarily identical in both cope and drag. (C) shows separate cope and drag patterns with, in this illustration, both runners and gates in the cope. The cope-and-drag pattern (B) is cheaper to make and has certain production advantages but admittedly allows no choice in the placing of runner and gates in cope or drag. Occasionally this is a disadvantage.

Up to this point we have discussed miscellaneous

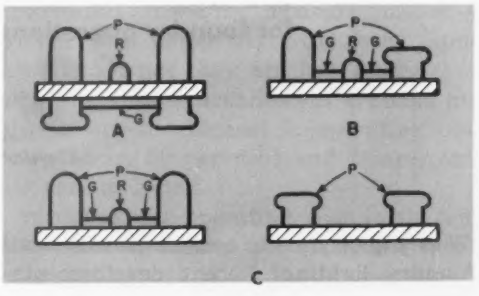
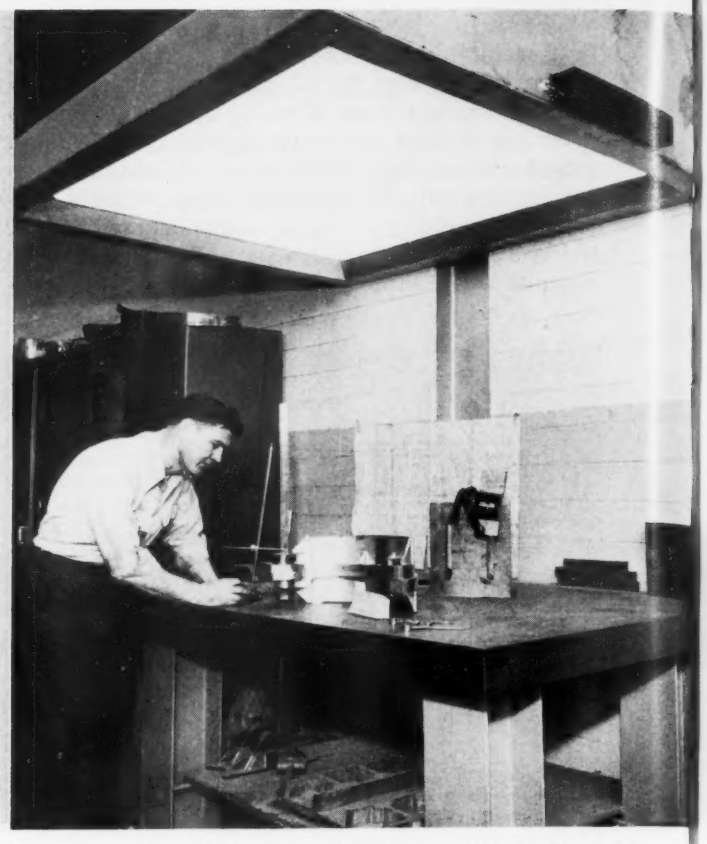


Fig. 7—Three types of pattern plate construction. *A* is matchplate, *B* a cope-and-drag pattern. *C* shows separate cope and drag patterns

considerations which have a bearing on gating and risering. They cover the points which are of basic importance in the production of casting free from misruns, cold shuts, trapped gas and dirt inclusions. We have yet to consider what is necessary to maintain a feed to the castings during solidification in order to avoid shrinkage cavities and microshrinkage. These are matters which depend upon the solidification character of the particular metal we happen to be dealing with.

In this respect the various copper-base alloys differ widely from one another and from the ferrous and light alloys. The next article will deal briefly with the theory of solidification and then attempt to determine how this applies to the brass foundryman's gating problems. Risering for large castings will also be discussed.

How To Evaluate Foundry Lighting Systems



Indirect light hood has a dome-shaped sheet metal reflector painted white with one 90-w fluorescent lamp on each side, one 100-w incandescent at each corner

Different light sources are described, features explained and suggestions made for choosing the type best suited for foundry operations. This is the second of three articles

By FRANK E. MUELLER
Industrial Sales Promotion
Cleveland Electric Illuminating Co.
Cleveland

NOW is a good time to consider modernization of foundry lighting. Recent developments have increased the efficiency of the three types of light sources available to the point where today's dollar buys more lighting than ever before.

Incandescent—Since 1937 when the coiled-coil filaments were introduced, the incandescent lamp has had practically no increase in efficiency. In December, 1955, a 15 per cent improvement in efficiency was announced for lamps of 300 watts and over. This 15 per cent additional light output is worth the cost of the lamp, based on average lighting costs. It's almost like getting the lamp free.

Mercury—The mercury light source has been popular in foundries because of its high light output and good efficiency. The 400-watt straight mercury source with its characteristic bluish light has shown a 10.5 per cent increase in efficiency since the start of 1954. Also, since that time the color-improved or fluorescent 400-watt lamp has been improved 17.5 per cent in efficiency.

The reflector lamps, which have become popular because of their improved maintenance characteristics, also show improvement. Silvered and fluorescent types of mercury lamps show an increase in efficiency of 24 and 66 per cent, respectively. It is estimated that the foundry using this reflector lamp today gets over twice as much as it did for its lighting dollar at the start of 1954.

Fluorescent—Slimline and rapid-start lamps are just a few of the new fluorescent sources brought out in recent years. Since 1950, slimline lamps have had a 31 per cent increase in light output, a 38 per cent longer life at 6 hours per start and a 7 per cent lower net lamp cost. In that time the regular 40-watt fluorescent lamps have shown a 29 per cent increase in light output, a 10 per cent longer life at 6 hours per start and a 2½ per cent lower net lamp cost.

Based on an electrical energy rate of 1½ cents per kilowatt hour, these improvements since 1950 add up to a lighting bonus of $6.96 for each 96-in. T12 slimline lamp used or 41 per cent more for each lighting dollar and $2.90 for each 40-watt fluorescent lamp used or 32 per cent more for each

Southern Shuttles Div., Steel Heddle Mfg. Co.

Pouring technique is improved by 40 foot-candles of light, and maintenance is simplified by 500-w incandescent reflector lamps on 16 x 16-ft centers

dollar which is expended for this lighting.

Development of the high-output, rapid-start lamp makes available a source with over 40 per cent more light output than any of the previous fluorescent lamps. This permits a higher lighting level produced more economically by an equal number of fixtures.

Which Light Source?—When foundry management thinks in terms of putting the lighting tool to work, incandescent, fluorescent and mercury light sources must be considered. None of these is a cure-all; but the three, put to work judiciously, can produce an effective lighting tool. In choosing a source for a specific seeing task there are three major considerations: Initial cost, operating cost and quality of light.

Initial Cost—First cost of a lighting system too often unduly influences the decision when other considerations are more important. Light is too reasonable to allow initial cost to dictate. The yearly owning and operating cost of a 50-foot-candle installation could run 3 to 6 cents per hour per worker. If each worker earns $2 per hour, he has to increase his efficiency only 1.5 to 3 per cent to pay for his share of the owning and operating cost of the lighting system.

Initial cost of fluorescent lighting usually is highest. It may run 20 to 50 per cent higher than a 500 to 1000-watt incandescent system and the straight 400-watt mercury systems. The 1000 and 3000-watt mercury systems are around 30 per cent less initially than the incandescent and 400-watt mercury systems. Higher output of the 1000 and 3000-watt mercury systems makes possible a system with fewer fixtures, fewer lamps and less wiring. Hence they are less costly.

Operating Cost—Incandescent systems practically always are the highest in operating cost, with mercury about 50 per cent and fluorescent about 55 per cent as much.

A yardstick for operating cost is the efficiency of the source or lumens per watt. The lumen indicates quantity of light. For example, a candle burning at the center of a sphere with a 1-foot radius delivers one lumen of light on each square foot of the inside surface of the sphere. One lumen per square foot in turn is a foot-candle.

The new axial filament incandescent lamps vary from 21.8 to 23.4 lumens per watt for the 500 and 1000-watt lamps, respectively. The new mercury lamps, including ballast, vary from 42 to 48.75 lumens per watt, with most of them in the higher range. The fluorescent lamps vary from 47 to 58 lumens per watt, with most in general use about 52.

The incandescent source has no control losses, and in order to give a fair comparison, ballast losses were included for the mercury and fluorescent sources.

Quality—If lighting isn't the right quality it won't do as much for the worker as it should. For example, if a worker is grinding to a scribed line or to a slip-over template of a finished cast surface, he would be bothered by specular reflec-

FOUNDRY LIGHTING EQUIPMENT

(Open or Enclosed)

A—Low Bay Incandescent

Direct lighting unit[1], 300 w and under, widespread light distribution. Has porcelain enameled dome reflector; silvered bowl diffusor; prismatic or mirrored glass reflector, or aluminum reflector.

B—Industrial Fluorescent

Direct lighting unit[1]. Has reflector of porcelain enamel; synthetic enamel[2]; plastic[2]; mirrored or prismatic glass, or aluminum.

C & E—High and Medium Bay

Direct incandescent or mercury lighting units, 300 to 1500 w. Have reflectors of aluminum; prismatic or mirrored glass, or porcelain enameled metal. Medium bay units (C) have medium to widespread light distribution. High bay units (E) have concentrating to medium spread distribution.

D—Lamp Assemblies

Incandescent floodlamp
Incandescent or mercury reflector lamp

F—High Bay Mercury

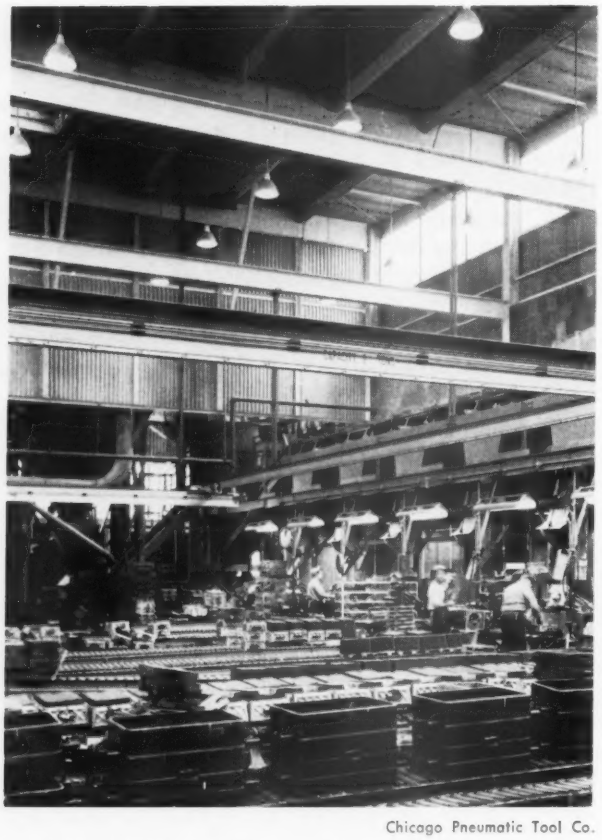
Equipped with 3-kw mercury lamps.

[1] Nondeteriorating surfaces which permit easy maintenance in atmospheres containing heavy dirt or corrosive fumes should be provided.

[2] In areas such as core rooms, inspection areas and receiving and shipping rooms, where light-colored ceilings and upper walls are practical, setmidirect lighting units, giving an upward component of light, will provide improved seeing and eye comfort.

When Mounting Height Is	Use Lighting Unit Type
12 ft or under	A or B
12 to 20 ft	A, B or C*
18 to 30 ft	B, C or D
30 to 100 ft	D or E
40 to 100 ft	F

*300 to 1500 w incandescent only



Chicago Pneumatic Tool Co.

Medium-high, 300-w incandescents give general light. An extra 40 foot-candles is provided at molding machines by two-lamp fluorescent units

tion on the polished surface if a small high brightness source is used. The quality in lighting furnished by a large-area, low-brightness source such as fluorescent is desirable.

In a foundry, fortunately, there are not too many cases where specular reflection is bothersome. Care must be taken in lighting design that there is not too high a concentration of wattage in fixtures that are too far apart. By trying to save on investment, quality is sacrificed by having nonuniform or spotty lighting. Direct glare also may be caused by having too bright a source unshielded, in the line of sight of the worker.

No hard and fast rule can be applied in the selection of a lighting system. Each must be chosen as dictated by its own requirements. The number of hours that the equipment is used influences how much can be spent, economically, for an initial investment. The greater the number of hours used each week, the more can be invested for a system with a lower operating cost. Foundries, like all heavy industry, have their dirty areas where maintenance is a problem. Dirty surroundings favor the compact, well controlled source.

Choosing the Lighting System—For illustrative purposes the method of developing a coreroom lighting system will be analyzed. Lighting engineers or specialists in large foundries would handle the assignment. The typical foundry would call upon a lighting specialist from one of its suppliers. The steps that the lighting specialist should utilize

Chicago Pneumatic Tool Co.

This coreroom has 35 foot-candles of illumination for easy seeing. Light is provided by 300-w, low-bay incandescent lamps set on 8 x 10-ft centers

to develop the proper system are listed below:

Analyze the Seeing Task — Are cores hand rammed, machine rammed or blown? Which operation has the most difficult seeing task for the coremaker? The lighting specialist might decide that the most difficult seeing tasks occur after the corebox halves are cleaned by air blast and the cavities are inspected for foreign material or sand remaining from the previous core, or when cores are examined for flaws and subsequently cleaned or repaired.

Are cores fine and intricate, medium or large? Are they made in wooden boxes painted with black or orange shellac? If they are, contrast and seeing conditions may be improved considerably by finishing the inner surfaces of the wooden boxes with white paint. Metal boxes may cause annoying specular reflections if small, high-brightness light sources are employed.

What type of benches is used? Bench tops with a light, natural wood finish are practical and desirable. They can be kept clean relatively easily and provide a comfortable visual environment with low brightness ratios between the work and its surroundings.

Physical Characteristics of Area — Corerooms generally are relatively small and clean compared with other foundry areas. The comfort of a lighting system is influenced greatly by brightness ratios between the work and its surroundings and lighting fixtures with their background. Ratios are kept lower by painting trusswork and ceilings white with a high reflection factor. Walls may be painted any color having a 50 to 60 per cent reflectance. A semigloss paint gives the most satisfaction for comfort and maintenance.

Lighting Requirements—At least 30 foot-candles should be provided for average coremaking. Fifty foot-candles would be advantageous for fine, intricate cores requiring accurate control of dimension and contour. Where metal coreboxes are used, large-area, low-brightness sources are needed to minimize specular reflection.

Lighting Recommendations—Published data on lighting calculations would be used to determine the number and location of fixtures required to deliver the desired foot-candle level. A localized general lighting system usually yields excellent results for mounting heights under 10 ft. If fluorescent fixtures are used, they should be centered over the worker's side of each bench, running parallel to the bench and at right angles to the normal line of sight. If the benches are on greater than 10-ft centers, a general lighting system is

desirable to provide good lighting conditions.

The physical surroundings and somewhat critical tasks in the coreroom area warrant consideration of lighting equipment providing an upward component for improved comfort.

Cost Per Light Year—After the seeing task, physical characteristics of the area, lighting requirements and lighting recommendations have been analyzed, types of equipment and sources to provide the quantity and quality of light required should be selected. The table, "Recommended Practices for Foundries," appearing in the first section of this article published last month, will act as a guide in selecting the type of equipment which will provide necessary illumination levels.

The cost per light year in supplying the necessary lighting by the systems that qualify should be analyzed. The cost per light year should indicate the yearly amortization of initial investment, the yearly operating cost and the yearly maintenance cost, including cleaning and relamping.

Appraising Lighting Equipment—Certain standards of performance of the equipment should be considered:

Shielding—For maximum visibility and comfort, bare light sources should be shielded. Shielding angles for incandescent sources vary from a minimum of 17½ degrees from the horizontal for the dome type to 30 degrees for certain deep bowl types. Units with greater comfort, having 35 degrees shielding, are now being designed. For fluorescent sources, the minimum crosswise shielding is 13 degrees. Through the addition of a longitudinal louver a shielding of 27 degrees may be gained. Newer designs will provide 30 and 35 degree shielding with greater comfort.

Brightness—Since discomfort and glare are so closely associated, it is desirable to know the brightness of the fixture. A rule of thumb is that lighting equipment installed so as to be visible within a 30 degree angle from the line of sight of a worker seated in a normal working position, must have a low or moderate surface brightness. One group of manufacturers feels that this should not exceed 678 foot-lamberts (a foot-lambert is a reflected lumen per square foot).

Efficiency — Many manufacturers agree that when efficiency of a lighting fixture is reduced below 78 per cent, the gain in comfort is at a much slower rate, and greater reduction in efficiency is not justified.

Light Distribution—The light distribution curve should show that the right amount of vertical or horizontal illumination will be delivered.

Reflecting Surfaces—Equipment should have a tough industrial finish with a reflection factor of

Coreroom workers have supplementary light provided by three-lamp, 40-w fluorescent units. Fixtures are positioned to avoid shadows on the work

Westinghouse Electric Corp.

Grid fixtures with fluorescent lamps provide over 100 foot-candles of comfortable and shadowless lighting for draftsmen working in this room

a minimum of 80 per cent for white surfaces.

Ease of Maintenance—Ease of reflector removal and cleaning, easy access to sockets, fluorescent ballasts and starters, and ventilation should be considered.

Ease of Installation—Ease of installation usually goes hand in hand with ease of maintenance. A fixture that is easy to install also is easy to maintain.

Mechanical Strength—A fixture usually may be appraised for mechanical strength. This is important because equipment receives rough handling at times.

Ballasts—Fluorescent lighting ballasts should have a high power factor for maximum voltage control and copper wire utilization.

Maintaining Lighting Equipment—A lighting fixture may become only 50 per cent efficient if not cleaned after six months' service. Light lost due to dirt and dust is paid for at the same rate per foot-candle as the useful light which reaches the work. To maintain the recommended level of illumination for specific seeing tasks, it is suggested that fixtures be cleaned often enough to keep a maintenance design factor of 65 to 70 per cent, depending on the foundry area. The maintenance design factor indicates per cent of initial light output a system will provide under normal operating conditions of dirty lamps and reflectors and depreciation of light output during lamp life.

If a poor maintenance program is followed, more fixtures will have to be installed in the system to maintain an equal factor. It is cheaper to have a lighting system designed to deliver at least 70 per cent illumination efficiency through proper maintenance than to have a system with a maintenance design factor of 50 per cent. The 50 per cent system would require 1.4 times as many fixtures as the 70 per cent system to provide the required illumination. That would add 40 per cent to the initial cost and to the kilowatt-hours used.

A 70 per cent maintenance design factor provides more effective lumens per fixture for equal wattage. Reflector type mercury and incandescent lamps are designed to provide that efficiency. As a result, foundries, under many conditions, can afford a higher unit cost per lamp and still have a lower overall cost per light year to provide a given illumination.

The new mercury vapor reflector lamp has a maintenance design factor of 84 per cent. On the other hand, if a 70 per cent maintenance design factor were provided for a conventional straight 400-watt mercury vapor lamp with reflectors, there would be six fixtures to every five reflector lamps. Every benefit that each type of system offers should be considered before a decision is made on the type to use.

ACKNOWLEDGMENT: The table on foundry lighting equipment and other material in this article were taken from the report, "Lighting for Foundries," published in 1952 by the Committee on Lighting for Foundries, Illuminating Engineering Society, New York.

EDITOR'S NOTE: An article on maintenance of foundry lighting equipment will be presented in an early issue.

Meetings between foundry suppliers and engineers have done much to further development of products

You Can

Sand control can be accomplished only when many interacting factors are integrated effectively. This article tells how it can be done

By EARL E. WOODLIFF
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Foundry Sand Service Engineering Co.
Detroit

FOUNDRIES making routine tests of moisture, permeability and green strength are practicing only sort of a catastrophe control. These tests alone do not provide sufficient knowledge of sand conditions. A great deal more must be known about sands to assure trouble-free use.

The all-important difference depends on the presence of a good, well trained man in charge of molding and core sands. Sand control men are made, not born. They cannot be successful without some training in control work and a good knowledge of some of the problems which overtake foundry sands. Common-sense thinking pays off in sand control as well as in other phases of foundry work.

Many foundries cannot afford a full-time sand control supervisor, but they operate very successfully because they do things according to good foundry practice.

The Right Materials—Sand control starts with selection of sands and binders. If the foundryman selects raw sands with too coarse a grain, he is bound to have an "open" sand, but casting roughness soon will plague him. The trend in recent years has been toward finer sand in all types of foundry work, and when fine sands are used, control problems increase. Control of ramming, moisture and expansion become everyday problems, but when they are accepted and solved, the results are gratifying.

One casting defect we hear little about today is metal penetration—but not because it does not exist. Too few people realize this condition results from use of too coarse a sand. Attempts to solve the problem by the use of finer sands often have resulted in even more detrimental defects such as scabs and buckles. These faults arise when a fine sand is substituted for a coarse one without the necessary adjustments of other practices. New and different materials are required for use with fine sand grains.

Another misconception is that the so-called "white" sands are more trouble-free than the "yellow" sands. Unfortunately, neither is trouble free. One requires a different control practice from the other. White sands generally are purer silica and have higher expansion properties than the yellow sands. This expansion has to be compensated for to a greater extent when white sands are used. On the other hand, the less pure yellow sands have a lower temperature of fusion and require more seacoal or other carbonaceous additives.

When finer sands are used for heavy molding in which dry-sand or skin-dry practice is employed, the wash will not penetrate deeply into the mold surface. Since there is less anchorage, this often results in wash "peel" and appearance of a scab or dirt in the casting. One solution to this problem is to increase penetration of the wash by addition of a wetting agent.

Equipment Is Important—Twenty-five years of experience has taught the author that the equipment used to prepare and convey the sand is vitally important. How many foundrymen have installed new and expensive equipment, only to find that the scrap loss sky-rockets for the first six months or a year? What often is the reason for this rise? Mainly it is because control of sand

Improve Your Sand

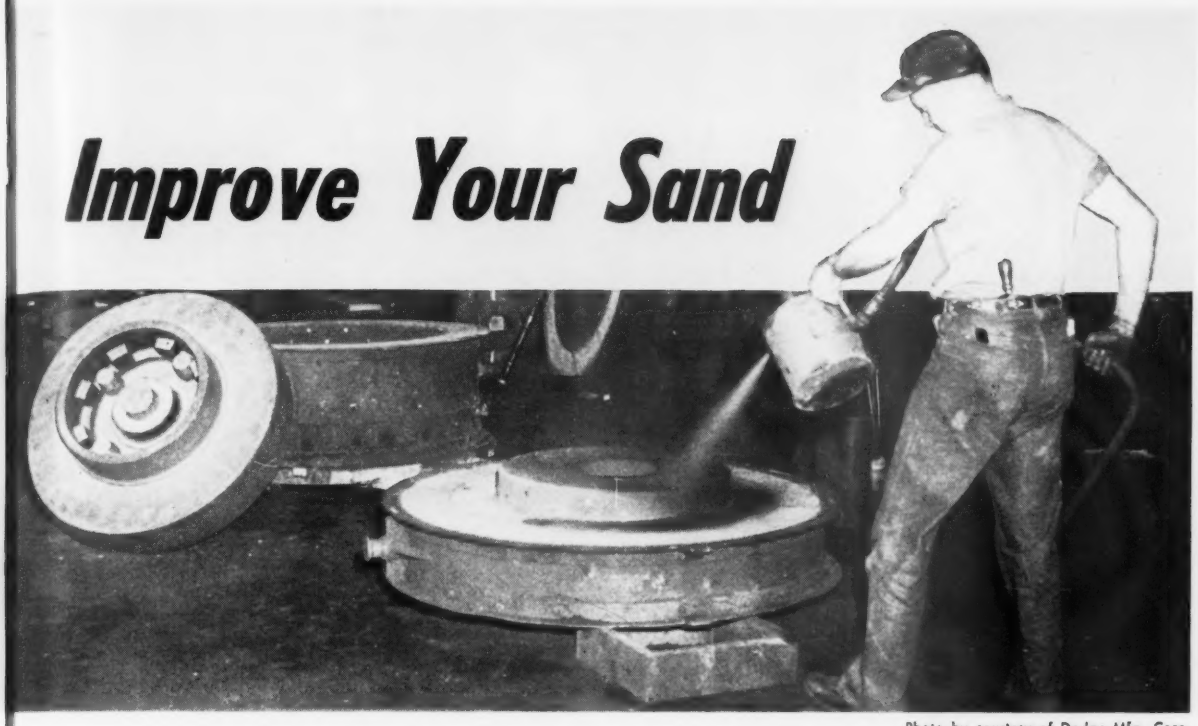


Photo by courtesy of Dodge Mfg. Corp.

Control of mold wash during application is an important phase of sand control

was taken for granted and proper information on the relationship between sand and binder selection versus equipment disease was not at hand.

Let us look at a few case examples: Most foundrymen today have been able to purchase a sand muller and obtain an unskilled laborer to operate it. A very good combination is a high-speed muller with a slow-speed operator who neglects to get all the binders into the mixture before it discharges. That slight oversight is corrected by giving the next batch a double charge of binders so that everything averages out at the day's end. Adjustment of the plows or cleaning of the muller is a job which surely is for someone other than the muller operator or the maintenance department. No one ever is sure just who is to look after the nasty job; so it never gets done. There was a time when mullers were open and one could see inside. Modern ones are enclosed and painted a bright color, so we walk by, see the nice paint job and never look inside.

Another interesting observation is that nearly all foundries have sand mixing equipment. The extra-rich ones have all the gadgets that are necessary, such as power steering and air conditioning, whereas their poorer brethern have to suffer along with just a plain old muller. Some measure binders with a beatup shovel or a battered can and others measure down to the very ounce.

Why not pay attention to the sand going into the batch too? Weigh-lorries are expensive but more accurate than measuring hoppers. Little is to be gained when the sand is "dumped" into the muller in varying amounts and the binders are measured accurately. Weigh the sand and *then* weigh the binders.

Ever Clean the Bins?—Still another interesting problem associated with modern methods involves sand storage bins. How often do you clean yours? Have you inspected them lately? Semi-dry sand never flows very well, and most bins do not work as designed. What good is a 75 or 150-ton storage bin if it "funnels" through the center and only a 4-ft hole is open?

Many young foundrymen cannot understand how oldtimers ever suffered along with such a material as natural molding sand. That old stuff had nothing compared to modern synthetic sand, according to some experts. Others state that the sand must be strong enough to satisfy all molding conditions—this in spite of the fact that the molder may have a molding machine which gives a crooked draw. One cannot sell shifted castings, but the molder is not to blame. The fact that the sand strength is it at some point between 13 and 20 psi never is questioned, but it often is to blame. Sands should not be too strong, and molders should expect to have a few broken molds if the patterns and the molding machines are not maintained.

Often when a customer receives his castings he feels he should get out the drawing to see whether they really *are* his castings or whether he should get new patterns, because the lumps and swells on the castings are not shown on the drawings and were not on the original patterns. One thing that impresses the customer is to see a lot of grind marks and welds on the castings. They make him

Photo courtesy of Texas Electric Steel Castings Co.

Operator weighs binders before making facing batch. Sand also is weighed in the muller

Photo by courtesy of Dodge Mfg. Corp.

Weighing sand into muller is as important for accurate batch control as weighing of binders

feel that the foundry has done a lot of work on his castings before delivering them.

What impresses him more is to run into a lot of deeply imbedded "dirt" with his brand new high-speed tools. The dirt usually is associated with a scab on the casting surface. This and the defect may have been covered by grinding and applied "putty," but the foundrymen knew it was there. It need not have been, had sand and molding conditions been a little better.

Modern equipment also has brought about many sand control problems. We in sand control have to accept them, not because it is the best move, but because it is necessity born of design of the foundry equipment.

Changes for the Worse—Here are a few changes of which the author does not approve:

1. Removal of riddles from foundries because a mechanical aerator is supposed to do the same work.

2. Fines removal. How many foundrymen have realized after a few weeks that they did not have too many fines in the first place and have found that the new sand dries out too rapidly and castings show dirt because the mold edges crumble? It is too high a price to pay for having all the dust drawn from the foundry.

3. Incomplete tempering time. Most sand systems are designed backward: Prepared sand should be stored for tempering, not shakeout sand. One hardly can expect sand to be completely tempered in 90 seconds.

4. Excessive mulling. This objection is not that the mulling cycle is too long but since sand is mulled several times a day or every day, it need not be mulled hard. Reduced mulling, by either shorter cycles or less pressure, makes for better working sand. It will allow the buildup of clay substance and create fewer sand expansion problems.

5. As mentioned earlier, bridging in bins is a direct result of improper bin design.

Remember that sand control is not sand testing. Although the two go hand-in-hand, they are not the same. Selection of the proper sands and binders will do much to improve sand control. Always remember that the problems of any foundry are its own and that the practices of others may or may not work in another shop. Each foundryman should work out the best practices for his operation by knowing each and every detail. Success comes mainly from application of good sense and from solving problems one by one as they arise. Here are a few common-sense practices:

1. Place responsible men on the mullers.

2. Maintain all sand preparation equipment at top efficiency at all times.

3. Measure all materials accurately for each batch. The measure which is most accurate is weighing. This includes sands as well as binders. Percentage-by-weight composition is the basis of good sand control.

4. Look to patterns, gating and molding machine maintenance before condemning the sand and taking steps to load it with binders.

5. Binders should be blended to obtain desired results just as sands are blended to obtain the desired grain distribution. Blending of sands for distribution, blending of clays to obtain desired strength properties and blending of seacoal and pitch or seacoal and stabilizers to give the desired thermal stability to sand are all receiving much consideration today in sand control practice.

Briefly, control of sand for gray iron is relatively simple as compared to those for other metals and alloys. The defects common to iron are rat-tails and buckles, blows from cores and mold, buckle and gate scabs, mold crush and dirt, metal penetration in pockets and cores, core veining and casting swells and strains.

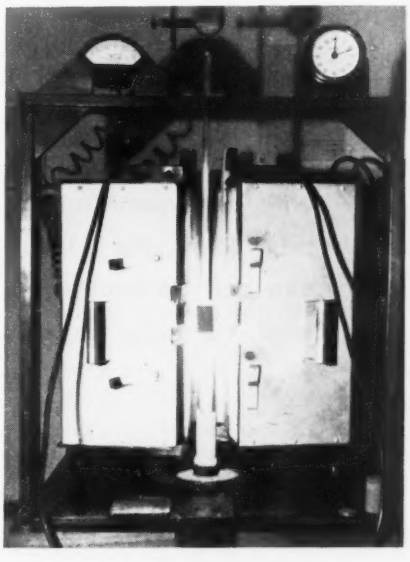
Designing the Sand—There are some other lesser defects, but the foregoing list covers the major ones. Many of the defects are caused by sand expansion. This in turn is a result of high purity

silica (white) sand, sand that is too fine, ramming too hard and high moisture. Many of these conditions cannot be changed readily; consequently, we have to design a sand which will allow them to exist but will not produce expansion defects.

First, a sand must contain more clay, not only to supply green, dry or hot strength, but also to act as a cushion between grains and to hold moisture in the absorbed state.

This added clay also will hold moisture better when drying out is a problem, and it reduces blows. The best clay content is one which washes out between 11 and 16 per cent on the clay test. To obtain this result, a weaker clay than bentonite must be used for a "filler clay." Natural molding sand is an excellent source. The clay source does not matter as long as ample clay is present. Sometimes a blend of a strong and a weak clay will provide this higher clay. Fire clay bonds are good alone or supplemented with small amounts of bentonite.

For further control of expansion, seacoal is highly suitable for sands for iron. A combination of seacoal and a cereal flour, such as wheat flour, is highly suitable when expansion is bad. Sometimes



Control of thermal expansion of sand as measured on author's booking-type dilatometer is believed to be important study for control of foundry sand

seacoal and pitch are more desirable when castings are large and the sintering point of the base sand is not too high. To reduce gate scabbing, nothing is better than to increase the pitch binder content in green sand work. Gate scabbing is a result of sand with too low a fusion point, and expansion scabs of sand with too high a fusion point. The so-called stabilizers are for small work only and at best are limited compared with seacoal, pitch, wheat flour and corn flour. In short, not only combustibles content but also which item to use is important.

Casting swells, strains and metal penetration all go hand-in-hand and are associated with low density sand with too high a bond strength. Harder ramming of molds, which is a means of increasing mold density, tends to be helpful, but is not the true answer. In sand control, the use of a four-screen distribution is helpful, but it is better yet to use a clay such as fire clay to improve sand density and ramability. Actually, a reduction of green strength and an increase of minus 100-mesh grains are most helpful.

Mold crush and "dirt" are associated with either dry sand or sand with insufficient green deformation. Withholding water from sand is bad practice. Addition of water up to the desired temper point of the sand and the use of a high plastic cereal flour help to end these troubles.

Casting blows have many causes, but first look to metal entering core vents, then to cope height above the pattern. It should be at least one-half the casting depth, above the parting line and over the highest point of the pattern in the flask.

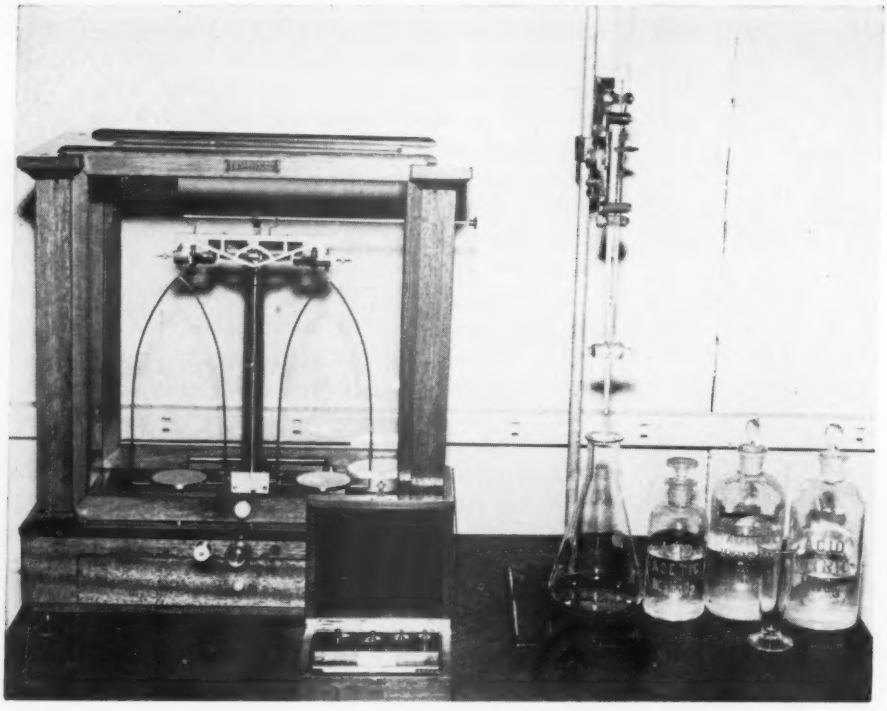
Clay Can Be Too Low—If the sand is too low in clay—under 10 per cent—look for unabsorbed water in the sand. Its sudden release will cause casting blows. Increase the clay or the absorbing binders in the sand. Other causes of blows may be cores with too high a cereal binder content or cores improperly vented. Cold metal is not the cause of blows, but it often greatly increases their frequency because of the quick freezing of the metal around gas pockets.

Core veining increases with the use of white or high-purity sands; it is a result of insufficient hot deformation. To reduce the condition, use clay, salt, lime or molding sand in limited amounts; change to a yellow sand like bank sand. Iron oxide also can be used in connection with a clay addition. Sometimes a better baking (more nearly complete type) core oil or the addition of ammonium sulphate as a drier is helpful.

The wide limits of foundry sands in which partial success may be had leads many foundrymen to feel that their sands are satisfactory. If these same sands were engineered, however, they would provide even safer limits an dassure more successful production of castings.

The abuse of sand often is at the root of its failure; therefore anyone delegated to its control must understand the action of mechanical processing on its final behavior. Screening, aeration, packing in hoppers, drying out caused by additives, pH factor control, cooling and fines removal are only a few of the variables which must be given consideration in sand control.

We have only begun to scratch the surface in this science, and the industry badly needs the services of as many young engineers as it can attract to it. The author personally feels that we too often are bogged down with accepted practices which act to retard forces in development. For example, in the past decade two new processes, shell molding and CO_2 sand hardening, have come to us from Germany. Both are fast changing old practices as we know them. Why do we lag behind in such developments?



View shows typical sample equipment needed for non-electrolytic determination of copper. A brass foundry can set up this simple system for less than $200

A CHEMICAL LABORATORY

Need Not Be Expensive

Here's the blueprint on a simple method for control of copper content in melts with an expenditure of less than $200. For $100 more, you can determine tin and lead contents, in addition

By FRANK J. VERSAGI
Chief Chemist
Mueller Brass Co., Port Huron, Mich.

FOR LESS than $200 spent on scientific equipment the small brass foundry can set up a simple laboratory which will enable the foundry to control the copper content of its melts. For approximately $100 more the laboratory can be set up to determine copper, tin, and lead.

The savings realized by such control—savings in metal, fuel, and reduced scrap—will more than pay for this small investment, usually within a few months.

It is possible to determine the important elements in brass and bronze using analytical methods other than the usual ones requiring relatively expensive electroplating equipment. A trained chemist is not needed to maintain this simple laboratory, and such methods make it possible for small companies to afford at least a minimum of production control over their operations.

Copper and Zinc Vary—Foundries which charge a fairly constant mixture of analyzed brass ingot and foundry scrap can take advantage of the fact that, for practical purposes, tin and lead remain constant during the melting and pouring of the metal. It is the zinc which is lost in most brass melting operations, and as the zinc content is lowered, the copper content increases proportionately.

Thus, it is possible to be quite sure of remaining within the chemical specifications of the alloy by controlling the copper content. Zinc can be added as needed, and the tin and lead remain essentially unaffected.

Fortunately, there is a fairly simple method for determining copper without electroplating apparatus, and this method is described in detail later.

The control of copper content is an important step in establishing control over melting and pouring practices. However, it is often desirable and/or necessary to know the tin and lead content of the final castings.

For very little more expenditure it is possible to set up these determinations, using analytical methods not so convenient as others available but still entirely suitable for foundry control purposes. The methods for tin and lead follow that for copper at the end of this article.

Foundries have found that, after a period of time, it is possible to establish control over charges, furnace temperatures, and alloying additions by having recorded these factors for many heats, then relating this information to the analyses of the resultant castings.

It will be impossible in the following discussion to avoid terms which may be unfamiliar to those with no chemical training whatever. In all cases, however, a person with high school chemistry should be able to understand all that is said. In some cases, it may be desirable to seek the aid of a high school science teacher in establishing the laboratory. The methods of analysis to be described can be performed by anyone once he has been trained—again perhaps by the science teacher.

Space Requirements—Although the work area will be somewhat crowded, it is possible to get by with a laboratory containing 24 sq ft of actual bench space. The benches should be 2 to 3 ft deep; the length may be made up in any reasonable combination — an 8 x 3-ft bench, two 4 x 3-ft benches, etc. Old tables or workbenches can readily be adapted for this purpose.

To be free from excess dust, the work area must be closed in—with four simple walls and a roof if no idle space, such as an old closet or storeroom, is available.

Since acid fumes will be driven off during some of the operations, it is necessary for health reasons to have a strong exhaust fan, exhausting to the outside, immediately above the hot plate where all the heating is done. If the hot plate is placed close to an outside wall, no ductwork will be necessary. A simple chemical hood may be built by placing asbestos board sides and a roof over the hot plate—with the sides and the roof extending to the wall and essentially boxing in the fan and the hot plate.

Such simple work can be accomplished in a morning or two—usually by labor crews already available. The cost of the exhaust fan, if no old fan is available, together with the necessary asbestos board should not exceed $30.

The hot plate can be either electric or gas. A simple gas burner with a ¼-in. steel plate on top makes a convenient tool. The plate should be at least 8 x 8 in.

It is advisable to pour all acids over a sink to prevent damage or injury if spillage occurs. If no sink is available, a large porcelain dish pan should be on hand, also a supply of water to dilute any solutions being dumped or which are accidentally spilled.

Equipment Required—The largest single expenditure will be for an analytical balance. A new simple student type balance costs about $110. It is usually possible, however, to obtain a used balance from schools, colleges or other concerns. Such balances may be purchased for as little as $25, and it is suggested that foundries with extremely small budgets try such sources.

A set of weights to be used with the balance cost about $37 new. Again, these may be purchased used in many cases.

The chemicals and glassware needed for the determination of copper add less than $50 to the costs listed above. Thus the total expenditure, exclusive of the labor to get the laboratory in shape, is less than $200—a small price, indeed, for the ability to control to a significant degree the chemical composition of the final castings as well

TABLE I—Approximate Cost for Scientific Apparatus for Copper Method

Analytical balance	$110.00
Weights	37.00
Buret	3.00
Three Erlenmeyer flasks	1.50
Nitric acid, 5 pints	3.50
Ammonium hydroxide, 5 pints	2.00
Acetic acid, 5 pints	5.00
Soluble starch	2.00
Standard brass sample	4.00
Ring stand	2.00
Buret clamp	1.50
Hot plate	15.00
	$186.50

Another $5 to $10 will cover the smaller items like stirring rods, measuring vials, bottles, etc. By purchasing used equipment, it is possible to cut this installation cost in half.

TABLE II—Approximate Cost of Additional Apparatus for Tin and Lead Methods

Electric muffle furnace	$55.00
Desiccator (drying compartment)	10.00
Desiccant (drying agent)	3.00
Three funnels, glass, 75 mm	1.75
Filter paper for tin	2.50
Wash bottle	3.00
Three porcelain crucibles, size 1	2.00
Three Gooch crucibles, size 3	3.00
Asbestos for Gooch crucibles	2.00
Filtering flask and funnel holder	2.50
Filter aspirator (for suction filtration)	2.00
Sulfuric acid, 5 pints	3.00
Glass funnel support	1.00
	$90.75

Electrolytic apparatus of the type shown here is used commonly for the determination of copper and lead, but is more expensive

as some of the production procedures involved.

If it is desired to go into the determination of tin and lead, the only major expense is for an electric muffle furnace, which costs about $55. In this furnace precipitates are ignited to constant weight before being cooled and weighed. It is not recommended that a used muffle furnace be purchased, since there is no way of determining whether the electrical resistance elements will fail in a day or a year.

Again, the cost of additional chemicals and glassware for the determination of tin and lead is small—about $40.

Chemical Analyses—The chemical methods of analysis for copper, tin and lead follow. At the end of each method is a discussion of particular interest to the nonchemist. As suggested earlier, if the foundry has no one familiar with chemistry, it will be wise to obtain the services of a science teacher, or even a college student, for a week or so to train an operator.

It is not to be expected that this brief exposure to chemistry will make scientists out of foundrymen. Nor is it to be expected that the results obtained by semitrained operators will be accurate enough to "take to court."

These methods will, however, permit those who adopt them to exercise a significant degree of scientific control over their operations and realize savings in so doing.

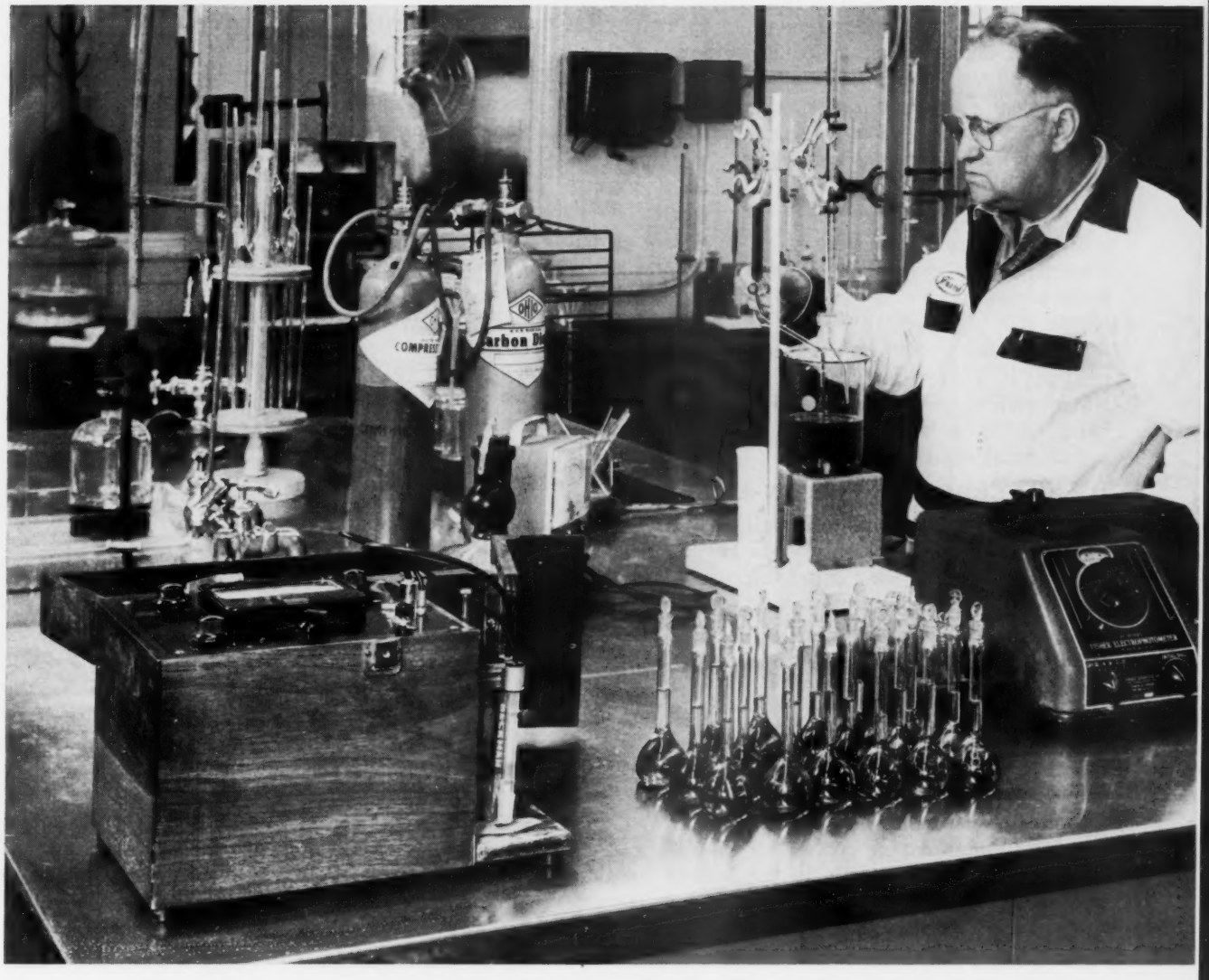
DETERMINATION OF COPPER

(Production Control Method)

Reagents: Nitric acid—2:1—two parts acid to one part water. Ammonium hydroxide—1:1. Acetic acid, concentrated. Potassium iodide, solid.

Starch solution—2.5 grams of soluble starch made into a paste with water and added slowly to 250 ml of boiling water. Cool and add five drops of chloroform or benzaldehyde as a preservative.

Standard sodium thiosulphate—27 to 40 grams per liter depending on the type of alloy being tested. Boil the water, then cool before adding the sodium thiosulphate. Add 2 grams of sodium hydroxide. Store in a dark bottle. Standardize against a standard brass similar to the type of samples to



View of a section of a larger laboratory shows some of the elaborate apparatus and equipment such establishments use

be run. (See discussion below for explanation.)
Procedure:

1. Transfer 0.3 to 0.4 gram of drillings into a 500-ml Erlenmeyer flask. Dissolve in 10 ml of 2:1 nitric acid and boil away all brown fumes.
2. Dilute to approximately 100 ml with water.
3. Add, with constant stirring, 1:1 ammonium hydroxide until the solution turns deep blue.
4. Add 10 ml of acetic acid and cool to room temperature.
5. Add 3 to 5 grams of solid potassium iodide.
6. Titrate with sodium thiosulphate until the iodine is almost gone as evidenced by the disappearance of the yellowish purple color.
7. Add 5 ml of starch solution.
8. Titrate, drop by drop, until the last trace of blue-black color disappears.

Copper percentage will equal 100 times the volume of sodium thiosulphate times the copper factor divided by the weight of the sample.
Discussion:

Standardizing a solution is the process of determining its strength with respect to a certain substance—in this case copper. This is done by running three samples of a standard brass obtained from the National Bureau of Standards through the method described above. (The Bureau of Standards in Washington has standard samples with certified analyses of yellow brass, red brass, bearings, bronzes, etc.)

Say that 0.300 gram of a standard sample containing 84.00 per cent copper were run and it took 25.0 ml of the sodium thiosulphate to reach an end point. Multiply the weight of the sample by the per cent copper and we get: $0.300 \times 0.8400 = 0.252$ gram of copper.

It took 25.0 ml of the sodium thiosulphate to react with this much copper; therefore, for each ml of the solution we have—0.252 divided by 25.0 or 0.00108 gram of copper. This means that each ml of our standard solution has a copper factor of 0.00108.

Three standard samples are run and the average of the results taken. The solution is restandardized once each week.

Copper may be determined in less than 15

minutes when this method is the one employed.

It is advisable to use 20 to 30 ml per titration. Therefore, for copper base alloys containing 55-75 per cent copper, it is advisable to use approximately 30 grams of sodium thiosulphate per liter. For alloys containing above 75 per cent copper, it is considered advisable to use 35 to 40 grams per liter.

If more than 0.5 per cent iron is known to be present, add 2 grams of solid sodium fluoride or ammonium fluoride before adding the potassium iodide.

The term "water" when used in a chemical method is always understood to mean distilled water (when the water is added to the solution being tested, or when the water is used to make up chemical solutions).

DETERMINATION OF TIN AND LEAD

Reagents: Nitric acid—2:1. Sulphuric acid—1:1. Hydrofluoric acid—concentrated. (This acid is needed only if the alloy being tested contains silicon as an alloying element.)

Apparatus: Electric muffle furnace, Gooch crucible, apparatus suitable for suction filtration, desiccator.

Procedure:

1. Dissolve 1 to 2 grams of drillings in a 250-ml beaker, using 10 ml of 2:1 nitric acid. Heat until all the brown fumes have been expelled.

2. If tin is present, add 50 ml of hot water and boil for 10 minutes.

3. Add filter paper pulp to the boiling solution and filter immediately through a close-texture filter paper. Wash the precipitate and the paper thoroughly with hot water, catching all the washings. (The paper is sufficiently washed when no blue color is left.)

4. Place the paper and precipitate in a previously ignited and weighed porcelain crucible.

5. Place the crucible on the hot plate and heat until all the excess water has been driven off, then place it near the open door of the hot muffle furnace, and char off the paper. Finally, place the crucible in the electric furnace and ignite for 15 minutes at a bright red heat.

6. Remove from the furnace, place on a cool metal plate and cool to about 200°C (no longer glowing, but still too hot to touch) in air, then transfer to the desiccator.

7. Cool to room temperature and weigh. The increase in weight is tin oxide. Tin percentage equals 100 times weight of tin oxide times 0.788 divided by weight of the sample.

8. To the filtrate from step 3 (the solution which passed through the filter paper) add 20 ml of 1:1 sulphuric acid.

9. Place the solution on the hottest portion of the hot plate and evaporate until strong white fumes are being driven off. Cool well, wash down the sides of the beaker with water and evaporate to fumes again.

10. Cool, dilute to about 150 ml and stir to dissolve all soluble salts.

11. Allow to stand 1 hour, then filter through a previously weighed Gooch crucible. Wash with cold water.

12. Dry the crucible on the hot plate for several minutes, then ignite in the electric oven at a dull red heat for 15 to 30 minutes. Cool in a desiccator and weigh. The increase in weight is lead sulfate.

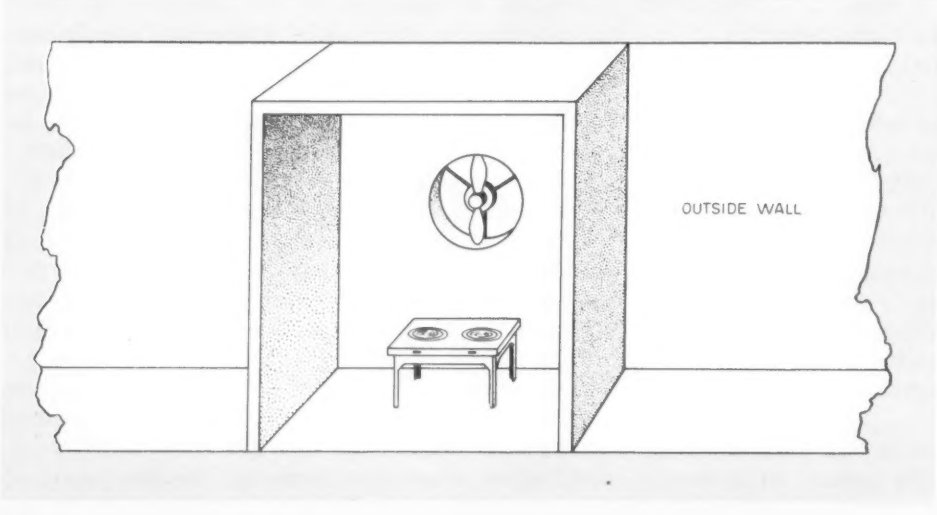
Lead percentage equals 100 times weight of lead sulphate times 0.683 divided by weight of sample.

Discussion:

If silicon is present in the alloy, it will not be necessary to filter it off like the tin. Instead, add 3 ml of hydrofluoric acid before evaporating to fumes with sulphuric acid. The silicon will volatilize away.

A Gooch crucible is a crucible with holes in its bottom. The holes are covered with a thin pad of asbestos fiber before use.

If desired, it is possible to treat the filtrate from the lead sulphate separation by the method for copper. In such a case, it is usually best to dilute the filtrate to a definite volume and take out a volume which will represent 0.3 to 0.4 gram of the original sample.



Acid fumes driven off during operations require an enclosure of this nature around hot plate on which heating is done. Strong exhaust fan immediately above plate is needed

STANDARD COST

DEPARTMENT Maintenance and Repair DATE

	COST		JAN	FEB	MARCH	APR	MAY	JUNE	AVG
	Total	Per Hr.	Per Hr.	CUM Per Hr.	CUM Per Hr.	CUM Per Hr.	CUM Per Hr.	CUM Per Hr.	CUM Per Hr.
FIXED EXPENSES :									
Depreciation									
Property Taxes									
Property Insurance									
Heating									
Lighting									
Foremen's Salary									
Clerk's Salary									
Employe's Taxes and Insurance									
Pensions									
Paid Vacations									
Employe's Welfare									
Share of Administrative & Office									
Other Fixed Expenses									
Total Fixed Expenses									
UNUSED OPERATING EXPENSES									
FIXED EXPENSES CHARGED TO PRODUCT									
VARIABLE EXPENSES :									
Indirect Labor									
Employe's Taxes and Insurance									
Pensions									
Paid Vacations									
Employe's Welfare									
Supplies									
Perishable Tools									
Equipment Repairs									
Power									
Other Variable Expenses									
Total Variable Expenses									
TOTAL CHARGEABLE EXPENSES									

Fig. 1—This chart provides for recording both fixed and variable charges which are established as standard for the maintenance and repair department

How To Determine

Maintenance and Repair Costs

In the Gray Iron Foundry

As mechanization becomes an increasingly important factor in production of castings, maintenance and repair costs tend to increase, too. This article explains how to determine the costs of these services

By ALBERT E. GROVER
Cost Consultant

THE departments needed for the production of gray iron castings are melting, coremaking, molding, and cleaning. For these direct producing departments to function properly, several nonproducing departments, here designated as Service Departments, are required.

Functions of these latter departments consist of making, repairing and storing patterns; storing metals; storing coke and other materials used for melting iron; storing sand for cores and molds; storing supplies for all direct and service departments; storing supplies for general office use. Some foundries may have additional departments, depending on the statistical information required for controlling the activities of the business.

Since the several elements of cost related to maintenance and repair of operating facilities cannot be equitably charged directly to other departments, clearance must be made through the maintenance and repair department. In this department its materials are measured and priced, its labor costs are calculated and its overhead is applied

ACTUAL COST

DEPARTMENT Maintenance and Repair_____ DATE_____

COST			COST	
Total	Per Hr.		Total	Per Hr.
		FIXED EXPENSES :		
		Depreciation		
		Property Taxes		
		Property Insurance		
		Heating		
		Lighting		
		Foreman's Salary		
		Clerk's Salary		
		Emp. Taxes & Insurance		
		Pensions		
		Paid Vacations		
		Employe's Welfare		
		Share of Adm. & Office		
		Other Fixed Expenses		
		Total Fixed Expenses		
		UNUSED OPERATING EXPENSES		
		CHARGED TO PRODUCT		
		VARIABLE EXPENSES :		
		Indirect Labor		
		Emp. Taxes & Insurance		
		Pensions		
		Paid Vacations		
		Employe's Welfare		
		Supplies		
		Perishable Tools		
		Equipment Repairs		
		Power		
		Other Variable Expenses		
		Total Variable Expenses		
		TOTAL CHARGEABLE EXPENSES		

Fig. 2—Chart used to record actual costs of fixed and variable charges for the month's transactions

to the operating costs of both direct and service departments.

Maintenance costs are those which are routine in their nature, such as lubrication, inspection, cleaning, etc., while repair costs are those associated with a special job—repairing one facility.

The accompanying charts are intended to demonstrate how the various overhead elements (accounts) of costs, related to the maintenance and repair department, are recorded and distributed to the several operating departments of the foundry.

The first chart (Fig. 1) provides for recording both fixed and variable charges established as standard for the maintenance and repair department. Budgeted amounts should not be used unless they are the same as the standards. Standards are established on normal operation of present operating facilities, whereas budgets are established on the basis of expected volume of business.

Standards should be established on the basis of a year's operation, then reduced to monthly amounts (cost section) for monthly comparison with actual costs.

The completed "Standard Cost" sheet is filed in a multiple-ring book 8½ x 11 inches. As shown in Fig. 1, this sheet is filed at the extreme left of the book so that ready comparison can be made between established standards and actual monthly costs as the latter are filed.

The second chart (Fig. 2) is used to record actual costs of both fixed and variable charges for the month's transactions. This report is similar in form to the one used to record standard costs, except that provision is made at the left for recording the actual costs for the month. The "cost" section at the right is used to record the cumulative date to date for the last six months' transactions.

So that the unusual fixed operating expenses may be excluded from the expenses charged to current operations, the "Total Fixed Expenses" are divided by the number of days established for the standard month, the resulting amount being recorded on the "Unused Operating Expenses" line of the report. This unusual amount is then subtracted from the total fixed expenses, and the difference is entered on the "Charged to Product" line of the report.

Variations in number of days actually worked in a month should be recognized if dependable costs are to be determined. This year, for example:

	A	B	C	D	E
January	31	10	21	$21,000	.085
February	29	8	21	21,000	.085
March	31	9	22	22,000	.090
April	30	9	21	21,000	.085
May	31	9	22	22,000	.090
June	30	10	20	20,000	.082
July	31	20	11	11,000	.046
August	31	8	23	23,000	.094
September	30	11	19	19,000	.079
October	31	8	23	23,000	.094
November	30	9	21	21,000	.085
December	31	10	21	21,000	.085
Total	366	121	245	$245,000	1.000

Designation of columns: A—Days in the month; B—Days shut down for Saturdays, Sundays, holidays, vacation and shop picnic; C—Operating days (A-B). Assuming the total chargeable expenses to be $245,000, the distributing rate would be $245,000 ÷ 245 or $1000 per working day. Column D shows normal operating cost and E the proportion of the year each month represents.

The "Total Variable Expenses" are added to the amount shown on the "Charged to Product" line, resulting in the "Total Chargeable Expenses" amount.

The "Total Chargeable Expenses" is divided by the "Direct Labor Hours Serving Other Departments" (Fig. 3), using the result as a basis for calculating the "Cost per Hour" of each expense item on the actual cost report (Fig. 2).

The report is then placed in the ring book, in such a position that the per-hour cost column is visible at the right of the "Standard Cost" sheet (Fig. 1). This allows management to compare actual cost per hour of each item with the same items on the standard cost sheet.

Reports for actual performance are prepared and filed in a like manner for each of the first six months. After the first month, the cumulative actual costs are determined and the amounts entered in the "Total and Per Hour Cost" columns of the monthly reports.

After the first six months' reports have been prepared and filed, the report for the first month is removed from the book. All of the other reports are moved two rings to the left in the book and the succeeding month's report placed in next to the last position in the book. After this insertion in the book, the average hourly costs of the six months is determined for each account, and the report placed in the last position in the book.

At the close of each month, a schedule ("Maintenance and Repair Costs") is prepared for the purpose of distributing materials, direct labor, and maintenance and repairs overhead to departments (Fig. 3). This distribution is accomplished as follows:

1. Enter the costs of materials used in maintaining and repairing operating facilities for each department (Column A).

2. Enter the direct labor (service to departments) cost, for maintaining and repairing operating facilities for each department (Column B).

3. Enter the hours spent in maintaining and repairing operating facilities for each department (Column C).

4. Enter the "Total Chargeable Expenses" as shown in the left column of the actual cost report (Fig. 2) on the last line of Column D, then prorate this amount to the listed departments on the basis of the hours shown in column C.

5. Add the amounts shown in Columns A, B and C, entering the totals in Column E. These are the amounts to be included in schedules of monthly operating cost for these departments.

Other methods of calculating and reporting maintenance and repair costs are known to the author, but most of them, although apparently inexpensive to operate, are so lacking in accuracy and dependability that their use is ineffective for management control.

In preparing this treatment of maintenance and repair costs, the author endeavors to make the method dependable and useful to management in controlling this activity by:

1. Determining the cost of unused operating facilities in the form of land, buildings and equipment, heating, lighting and other expenses related to personal activities. This amount is deducted from the total fixed expense to provide a proper charge to current operations. It also provides for reporting the cost of unused normal expenses to management, an item of considerable importance.

2. Furnishing management with statistical data, in form for comprehensive and timely comparisons of details related to maintenance and repair.

Fig. 3—Schedule like this one is prepared at close of each month to distribute materials, direct labor and maintenance and repairs overhead to the departments

MAINTENANCE AND REPAIR COSTS
DISTRIBUTED TO DEPARTMENTS

DESIGNATION OF COLUMNS :
A. Materials
B. Direct Labor Costs of Employes Chargeable to other departments.
C. Direct Labor Hours Serving Other Departments.
D. Overhead Expenses of Maintenance and Repair Department.
E. Total Maintenance and Repair Costs.

	A	B	C	D	E
DEPARTMENTS :					
Melting					
Coremaking					
Molding					
Cleaning					
Pattern Shop					
Pattern Storage					
Metal Storage					
Coke Storage					
Core Sand Storage					
Molding Sand Storage					
General Supply Storage					
Parking					
Office					
Total Distributed Costs					

Supervisory group analyzing film of an assembly operation. Their project reduced cost of the operation 50 per cent, saved $25,000 annually

Work Simplification

At Work in a Foundry

Work simplification is an attempt to use all of a worker's potential, mental and physical. This article describes how such a program operates and what benefits it offers, especially to foundries

By CHARLES BROWN
Work Simplification Engineer
Texas Foundries Inc.
Lufkin, Tex.

WORK simplification isn't something new. It is a better way of doing what many companies are already doing through suggestion systems or maybe just through a willingness to listen to ideas without any formal procedure for evaluating them.

Some companies, however, still believe that every job should be set up by an expert. Then the job should be done in the prescribed manner until an expert changes it. This particular philosophy was given impetus by Frank Taylor and his Scientific Management movement.

The Gilbreths enlarged on this philosophy by using the same basic approach, but giving more consideration to the human element. The field of industrial engineering mushroomed from these early beginnings and is today playing a vital role in the application of the scientific method to management decisions. Work simplification is an expansion of one area of industrial engineering.

Work simplification, from top management's viewpoint, is one more tool aiding in attaining the company's objectives. Its use will help make the company more efficient, resulting in a better product at a lower cost.

More specifically, work simplification is a planned program designed to "utilize the worker's head as well as his hands." They all come to work together, so why not use them?

Organized Common Sense—Still another way to look at a work simplification program is to view it as "the organized use of common sense." Every worker has common sense and work simplification training teaches him to organize it to his and the company's advantage. This gives rise to our work simplification slogan: "Work Smarter, Not Harder."

In 1951 the president of Texas Foundries, Col. Cal C. Chambers, attended the Industrial Management Society's annual meeting in Chicago. One of the talks he heard was Allan Mogensen's discussion of work simplification. He immediately became interested in the possibility of starting a work simplification program at Texas Foundries. As a result of his interest, our production manager, R. S. Bradshaw Jr., attended Mogensen's 1952 Work Simplification Executive Session at Sea Island, Ga. He was so impressed by the course that he had a member of the Industrial Engineering Department attend the six-weeks' work simplification course that same summer, at Lake Placid, N. Y., and in the fall we started work simplification training at Texas Foundries.

In addition to our own training course, we are continuing to send members of our management staff to Mogensen's work simplification conferences.

We started teaching work simplification at Texas Foundries in the fall of 1952 to two supervisory groups. In 1953, two more supervisory groups were trained and in 1954, one management group and a pilot group of hourly workers were trained.

Class of hourly workers in work simplification room is learning how to fill out a flow process chart. Classes are as informal and personalized as possible

In January, 1955 we started training hourly workers on a routine basis. So far, over 150 hourly workers have been trained.

At present we have classes going for both supervisory and hourly workers. We plan to train everyone in the next two or three years and then have refresher courses. We visualize it as a permanent program.

Objectives and Results—That's the background of our program; now let's take a look at the two separate courses and the objectives and results of each.

The supervisory course consists of 13 lessons. Each one is approximately two hours long. The objectives of this course are: 1. Cost reduction. 2. Supervisory development. 3. Supervisory evaluation. 4. Co-operativeness.

To obtain these objectives the course content is centered around three areas: 1. Industrial engineering techniques. 2. Human relations. 3. Use of time and energy.

Industrial Engineering techniques taught are the use of: 1. The flow process chart. 2. The operator chart. 3. The multiple activity chart. 4. The procedure flow chart. 5. The flow diagram. 6. Motion economy. 7. Film analysis.

These techniques are used, first, to get all the facts concerning a particular problem, and second, to help in the analysis and solution of the problem. Each technique is explained and demonstrated and then the class uses it to solve a sample problem. Next the class is divided into small groups and each group selects an actual plant problem and applies the techniques applicable to its solution. This systematic approach to a problem and its solution avoids the hasty, impractical decisions often made and also results in a greater net cost reduction than would otherwise be obtained.

Human Relations training is a very important part of the course because changes in methods or procedures involve people. The improved method is of little value until actually put into effect. In order to maximize the number of completed projects that actually are used and to minimize the difficulty in getting them installed, much time is spent discussing such topics as resistance to change, resentment of criticism, personality development, cumulative nature of tension, and ways of introducing new ideas.

Use of Time and Energy is emphasized in the training to illustrate that it's not only "what you do but the way you do it" that is important. The efficiency of supervision is discussed and a schedule of time spent on various aspects of the supervisory job is reviewed. To highlight this area we use the slogan, "Don't be too busy to be efficient."

That is a brief review of the course content and how it is presented. Now let's look at the results. The last three objectives of the work simplification training are supervisory development, supervisory evaluation, and co-operativeness.

These areas are difficult to measure, but the feeling of management is that work simplification has accomplished much in all three. Superintendents are anxious to have their new people put through the course as soon as possible, indicating their recognition of its value.

The first objective of the training—cost reduction—is more easily measured, and the table below partly indicates what has been accomplished.

Year	Projects Submitted	Projects Installed	Annual Cost Reduction	Cost of Installation
1953	54	49	$28,288.55	$4,725.09
1954	26	22	$22,013.71	$1,216.42
1955	43	37	$26,554.79	$3,685.72

These results were calculated only on projects that were formally processed through the Work Simplification Section. Many other improvements were made as a result of class discussions and the application of the systematic approach, without a formal project. The accompanying picture of the group around the analysis projector is an example of a problem solved by using the techniques learned in work simplification.

The hourly course has as its objectives: 1. Improved morale. 2. Worker development. 3. Economic education. 4. Decreased resistance to method changes. 5. Evaluation of workers' potential. 6. Cost reduction.

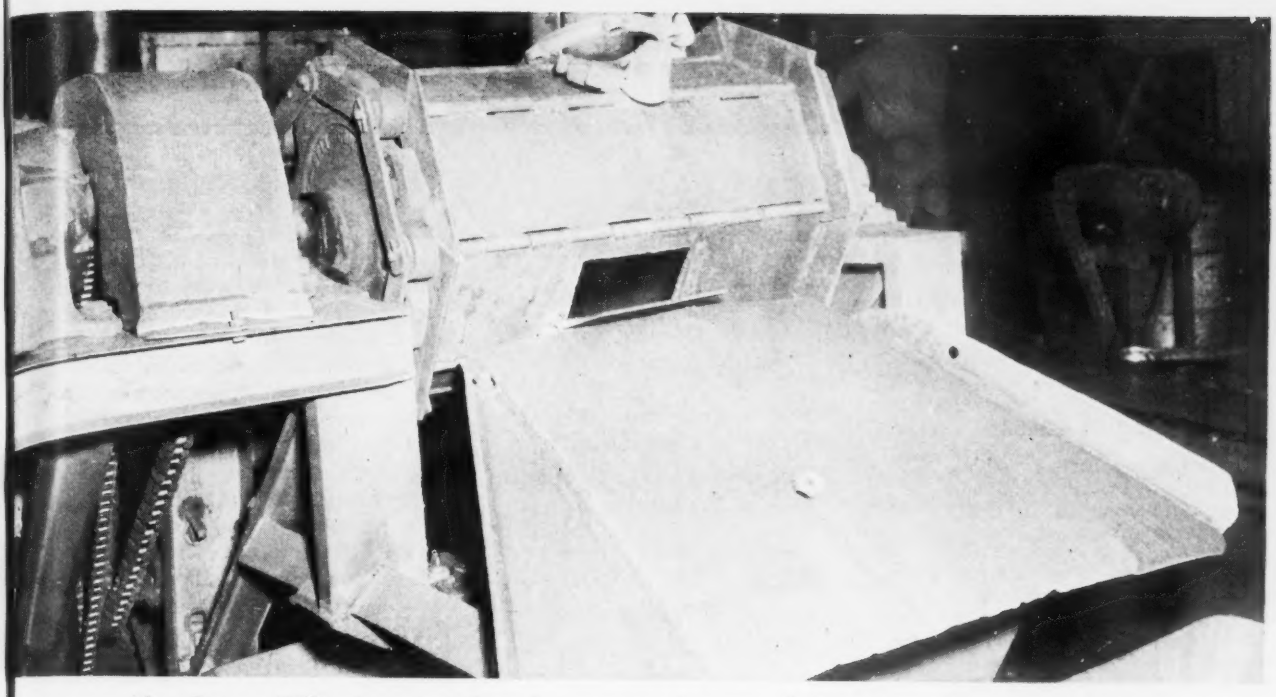
The training takes seven sessions of two hours each. The classes are held after the work day and the workers are paid their regular hourly rate for time spent in class. The course content is similar to that in the supervisory course with less emphasis placed on the more difficult techniques and more emphasis placed on economic education and motivation.

Again, the first five objectives are difficult to measure, but we feel that they are actually more important than the direct dollar cost reduction. The foremen notice a definite improvement in receptiveness to new methods and equipment. Many of the foremen have gotten on a much more personal basis with their men through discussions that were initiated by a work simplification proj-

Employee George Williams noticed that stray metal had to be removed periodically from inside apron conveyor. It sometimes jammed the sprocket wheel

George Williams receives award check and work simplification certificate from Col. Cal Chambers, company president, as his supervisor, Sam Sayers, watches

Below—"Tex Fax" is a character created by work simplification at Texas Foundries. He is a symbol of the principle that it "takes facts" to simplify jobs



After George William's project, flaps that open on the return half of the cycle were put on the apron conveyors so that accumulated bits of metal drop through. It eliminated periodic checks and the jammed sprockets which had occurred despite checking

ect. The foremen's eagerness to have their men go through the training program also indicates that the first five objectives are being achieved. The work simplification program is an excellent vehicle for achieving many "Human Relations" objectives and is very worthwhile for that reason alone. In the area of cost reduction the hourly workers turned in 64 projects in 1955, of which 45 were installed for an annual cost reduction of over $9000.

The hourly workers are eligible for a cash award when their project is installed and in operation. These awards are based on 15 to 25 per cent of the net cost reduction for the first year. Nearly $1500 was paid out for awards in 1955, the average award being $32.73.

Keys to the Program—Motivation and stimulation are the key factors in maintaining an active work simplification program. We have several "gimmicks" to keep work simplification before the workers and to recognize individuals that complete projects.

First of all, and undoubtedly the most important, we have the enthusiastic backing and participation of top management. Work simplification is referred to at nearly every plant or management group meeting. The president or works manager presents the award checks to the hourly workers. He compliments them on their project and thanks them for doing their bit to keep Texas Foundries one of the most progressive in the industry.

Second, an annual report on work simplification is distributed to all employees. It contains the name of everyone completing a project in the previous year. In it we also give special recognition to the hourly workers receiving the two largest award checks and to the individual who has completed the most projects during the previous year.

Third, every work simplification project is reported in our plant paper and usually a picture of the "before" and "after" is included. Also, a picture of the hourly workers receiving their award checks in the front office is published in the paper.

Fourth, each time a project is completed the individual's picture is posted on the bulletin board.

Fifth, a work simplification certificate is given for the first project completed by each individual. They do not receive a diploma when they complete the class training, but they are told that they haven't completed the course until they have completed a project. So the certificate serves as a diploma.

Sixth, the supervisory group receives a work simplification tie for its first project, a cigarette lighter for the first five projects, and a $50 gift certificate after the completion of ten projects. In addition, the supervisory group is on an individual cost reduction incentive bonus plan, so it benefits directly from cost reductions in the departments.

Seventh, movies are made of outstanding projects and shown to the workers during their lunch period. A movie of three of these projects was entered in the Industrial Management Society's annual methods improvement contest and took second prize. This gave the work simplification program another boost, and the individuals who completed the projects in the movie also received certificates from the Industrial Management Society. (This film is available from the Industrial Management Society.)

By the use of these seven "gimmicks" and a continuing interest by our management staff, we at Texas Foundries plan to continue making "work simplification work in a foundry."

Questions and Answers

Surface defects on aluminum castings may result from high pouring temperature which is necessitated by small gates . . . Describes various procedures for increasing carbon . . . Discusses some of the points in front slagging . . . Smoothness depends on sand

Suggests Enlarging of Gates

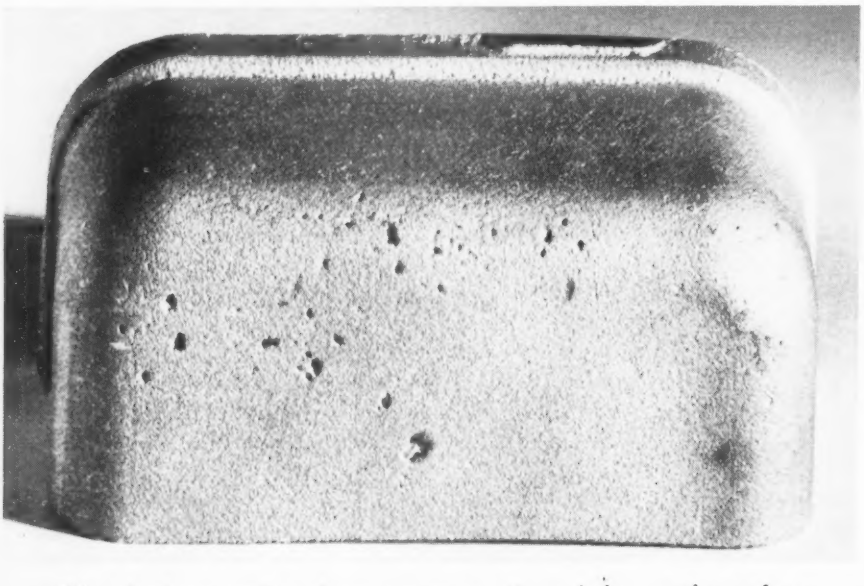
QUESTION Under separate cover we are sending sample castings made of No. 319 aluminum alloy (3 Cu, 6 Si) on which we would like an opinion as to the cause of the very apparent defect. Molding sand used is No. 1 Albany with a moisture content of 6.8 to 7.2 per cent. Pouring temperature is 1450° F, and metal is heated to 1500°. A proprietary degasifier is employed. Castings are gated from a runner with two ingates. Sprue is 1 in. in diam. We believe that the defect is caused by oxide inclusions and gas absorption resulting from high temperature as well as by turbulent metal flow caused by the large sprue. The latter, however, probably is secondary to poor melting practice.

ANSWER Unfortunately, the specimens forwarded to us had been cleaned, and there is no indication of whether or not such material as dross, sand particles, etc. occupied some of the holes visible on the surface. Your remarks imply, however, that some material was present. Fracturing the specimens seemed to indicate that gas might be present, but with thin sections solidification occurs so rapidly that the gases are held in suspension, and do not have the opportunity to collect as pear-shaped bubbles just under the skin as in the case of heavy sections.

While the castings have thin walls, we believe that the pouring temperature is rather high, and suggest that you try reducing it to 1400° F or below if possible. Use of lower melting and pouring temperatures undoubtedly will decrease, if not eliminate, your troubles. You do not mention that you have looked into that phase, but in examining the casting closely we suspect that it might have been tried and difficulty with cold shuts was encountered. We surmise this because the attachment of the ingates provide a cross-sectional area of only about 1/16 x ¾ or 1 in. each instead of what at first glance appears to be ¼ x ¾-in.

The reason for the discrepancy easily can be ascertained by sectioning the casting where the ingate is attached. The lower section of the flange where the major portion of the ingate is located will be seen to be only about 1/16-in. thick. About only the top 1/16-in. of the ingate enters into the heavier 5/32-in.-thick section of the casting. Hence, we suggest extending the height of the ingate to the top of the flange and making it rectangular in form instead of the segment of a circle. Possibly it might be wise to increase the width also. Increasing the height as suggested will increase the entrance area at least twice what it now is, and should permit a worthwhile decrease in pouring temperature.

If you suspect that gas is present in the metal, pour a test plug about 1 in. in diam or square and 3 in. long in green sand. As soon as it solidifies, break it and examine the structure, especially just under the skin. If gas is present it usually will show up as small bubbles or pinholes in that area. If they are present, another addition of degasifying agent should be made, and another test piece made, and examined.



Thin aluminum casting shows numerous pits or holes on the surface

Wants to Increase the Carbon

QUESTION In our country we can obtain pig iron only with 2.9 to 3.0 per cent carbon. Our problem is to develop a suitable technique to insure 3.3 to 3.6 per cent in the castings, which are light, averaging 10 lb. We use oil-fired crucible type furnaces and a 200-kva direct arc electric furnace. Also, in case we install a cupola, what method would provide the desired pickup in carbon?

ANSWER Carbon pickup in the melting units you now are using primarily is a time-temperature relationship in that the longer the iron is in contact with the carbonaceous material and the higher the temperature, the greater the absorption.

In the case of the oil-fired crucible units, we believe that addition of fairly coarse charcoal, coke (preferably petroleum or pitch), graphite in lumps or crushed electrode stubs, etc. in the bottom of the crucible will help. The longer the contact, the higher the pickup. The same method can be used in the electric furnace, or the electrodes could be dipped into the molten bath. Experimental work would have to be done to determine the most satisfactory practice in both cases.

Carbon would be absorbed in the cupola without difficulty since the iron and coke are in intimate contact at all times. To increase carbon pickup, however, additions of petroleum, pitch coke, lump graphite, etc. have been added to the coke splits and placed in the coke bed. Allow-

ing the iron to remain in the well or reservoir of the cupola as long as possible also increases carbon absorption. Use of a basic lining in the cupola with basic slags will result in production of high-carbon iron.

Perhaps one of the simplest procedures to obtain the desired carbon pickup in all cases would be to use the recently developed injection method. That practice uses nitrogen gas as the carrier to inject finely ground graphite, preferably high-purity grade, into the molten iron. Graphite size is minus 20 mesh and injected into the iron at the rate of 4 lb per minute in a nitrogen gas stream flowing at the rate of 1.25 cu ft per minute. Carbon recovery is 50 per cent or better.

Slagging Cupola from Front

QUESTION We recently have mechanized our gray iron foundry and have purchased a mixing ladle or forehearth. Now we are considering front slagging from the cupola instead of our present practice of back slagging, allowing the iron to flow continuously from the taphole instead of tapping intermittently. Can you advise us on the size of the taphole, length and depth of the well for the best possible results? We have been told that a 2-in. taphole now is being used for front slagging, with 5 in. of iron being held in the cupola well at all times until the end of the heat when it it is drained through a hole in the front slagger. It strikes us that 5 in. of iron in the cupola would be 3 in. above the top of the taphole, and would not permit any of the slag to flow out of the slag hole.

ANSWER While the figures you mention in connection with the front-slagging spout are approximately correct, there is a misunderstanding as to the location of the 5-in. height of iron which is maintained. That figure refers to the iron behind the dam outside the cupola, and not in the cupola. Additionally, the height mentioned is that from the top of the taphole to the bottom edge of the spout or trough which conducts the molten iron from the cupola to the mixing ladle or forehearth.

According to an article—"Front-slagging Cupolas" by W. W. Levi in the January, 1955 issue of FOUNDRY—no definite relationship need exist between the melting rate of the cupola and the size of the taphole. A 2-in.-diam hole will serve satisfactorily whether the cupola is melting 5 or 25 tons per hour.

The article also describes the procedure in determining the height of the metal in the dam. Briefly, the highest operating wind pressure expected during the heat is the basis for determining the distance from the top of the taphole to the bottom of the trough or spout. Preferably spout construction at that point (A) should be in the form of a 4-in. ridge across the spout in case adjustments are necessary. Distance (X) from top of the taphole to bottom of the trough in inches should be somewhat less than one-fourth the expected windbox pressure. After the cupola is tapped, slag should appear on the surface of the metal in front of the taphole in a maximum of 20 minutes elapsed time from the first tap. If no slag appears, the height of the ridge (A) should be reduced ¼-in. and time allowed for establishment of the new level for the liquids.

This procedure is repeated until slag does appear, and no further adjustment need be made if the slag will discharge from the cupola in sufficient volume to run over the overflow in about 10 minutes after it makes its first appearance.

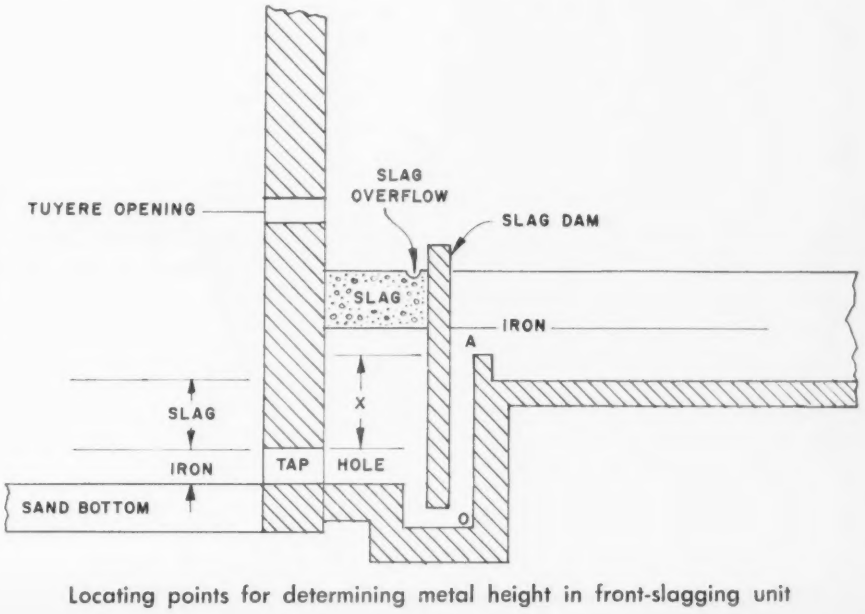
This method establishes the working height, and it should be measured carefully from some fixed point on the spout frame. The new adjusted height becomes the height for the next day's heat. Adjustments on the second heat may be necessary, and if any, the new height is measured from the fixed point. Procedure is repeated on subsequent heats or until an average height is obtained which will allow the cupola to begin slagging in not more than 20 minutes, and effectively will seal the taphole against blowing.

Obtaining Smoother Surfaces

QUESTION We are aware that many foundries are using synthetic mixtures for molding, and have sand mulling and other equipment which we do not have. However, we would like to know if you can suggest a facing sand mixture for obtaining smoother surfaces on our gray iron castings.

ANSWER Without suitable mixing or mulling equipment, it would not be advisable for you to try making up synthetic sand since it is essential that the sand grains be coated uniformly and thoroughly with clay or bentonite. We believe it will be well worth your while to invest in one small unit for mixing your facing sand since then you will secure good blending of sand, binder, moisture and additives such as seacoal.

Surface smoothness of castings generally depends upon the fineness of the sand used, but it cannot be too fine or trouble will be encountered from blows caused by low permeability. The practice is to use sand which is fine enough to provide a satisfactory surface but has sufficient



Locating points for determining metal height in front-slagging unit

permeability to keep blows at a minimum.

Since we do not have any knowledge of your present sand characteristics, we can only suggest that you obtain from your sand supplier small lots of finer grain sand and try them out. Facing sands for gray iron usually are made with half new and half old sand plus the addition of 5 to 10 per cent seacoal.

Effect of Lead in Gray Iron

QUESTION We have a problem coming up soon in that we will be receiving about 15 tons a month of leaded, free-machining steel to be used for manufacturing some of our other products. Scrap from those operations will be sent to the cupola for melting, and we would like to know what effect this leaded steel will have on our class 30 iron. How much can be tolerated? What are the danger signs? Range of lead in the steel is 0.15 to 0.35 per cent, and we use 100 lb steel scrap in a 600-lb charge.

ANSWER Studies indicate that lead in gray iron decreases the tensile strength and impact properties and increases the hardness. These findings have been reconfirmed by some investigational work by Oestberg, as reported in *Gjuteriet* (Stockholm, Sweden) in 1955. According to him, quantitative tests as well as practical experience indicate that the maximum tolerable lead without affecting impact strength is 0.010 per cent. He also indicated that laboratory experiments on removal of lead in an induction furnace showed the highest rate at a temperature of 2462° F. Other temperatures tried ranged from 2372° to 2552°.

Lead does not form a compound with iron or steel and appears to exist as a colloidal suspension which cannot be detected even with a high-powered microscope. It would seem that the presence of lead must be determined by changes in the mechanical properties previously mentioned or by qualitative chemical analysis. A chemical method suggested by Pigott in *Ferrous Analysis* is to disolve a sample in HCl and oxidize with the minimum HNO_3. Pour the solution into an excess of hot 20 per cent NaOH, filter, and acidify with acetic acid. One portion of the solution is treated with 10 per cent ammonium molybdate solution, which gives a white precipitate of lead molybdate. Another portion is treated with a solution of potassium dichromate, which gives the characteristic yellow precipitate of lead chromate.

We believe that the amount of lead in your metal after remelting the lead-bearing scrap probably will be less than the 0.01 per cent mentioned by Oestberg as being tolerable. Addition of 100 lb of the steel scrap to a 600-lb charge would result in from 0.025 to 0.06 per cent lead in the resulting iron if all of it was recovered. While that is a possibility, it is more likely that most of the lead will be oxidized or boiled off during melting. Lead boils at 2787° F. As indicated by Oestberg, the lead does evaporate when held in an induction furnace at an elevated temperature. Hence, it is logical to assume that in the cupola with high temperature and presence of air the elimination of lead would be fairly rapid.

Liability for Pattern Loss

QUESTION Over our entire period of operations we have stored customers' patterns without cost to the owners. Some of the patterns are active and others inactive and obsolete. We have no current issue or controversy on the subject, but would like to know the general and accepted position of foundries in the matter of liability in case of loss or damage to patterns due to fire, windstorm, etc.

ANSWER In general, we believe that foundries endeavor to protect themselves against liability for pattern loss or damage by fire or otherwise by putting its customers on notice of the "Terms and Conditions of Sales of the Gray Iron Foundry Industry," as compiled by the Gray Iron Founders' Society and approved by the National Association of Purchasing Agents with special reference to the clause relating to loss of, or damage to, patterns. Generally recognized terms and conditions of sales run somewhat as follows:

"The seller is not responsible for loss of, or damage to, customers' equipment by fire or other casualties beyond his control.

"It shall be the obligation of the customer to cover his equipment with proper insurance. We do not insure customers' patterns."

These conditions may be printed on the reverse side of the firm's letterhead, on quotation forms, and on its acknowledgements and invoices. Also some foundries communicate with customers at least once a year about pattern equipment on hand. They make certain that the customer knows that the foundry is not carrying insurance on the patterns, and inform him that the foundry is not responsible or liable for customers' pattern equipment other than the ordinary responsibility of a "bailee for hire."

However, in a discussion "Are You Protected Against Loss of Customers' Patterns" which was published in the February, 1953 issue of FOUNDRY, a committee of the Gray Iron Founders' Society points out—"Many foundrymen would assume that when a customer has been warned in this way he would insure his property adequately, and that the existence of such insurance would eliminate the possibility of a claim against the foundryman. This is not so. In event of loss the insurance company will not hesitate to bring a claim against the foundry for loss or damage to the patterns if there appears to be any evidence of negligence on the part of the foundry."

In view of such possibility it was recommended that the individual foundry through its insurance and legal advisors, explore the matter, and perhaps obtain bailee's legal liability insurance which many foundries do carry.

Lining Material for a Cupola

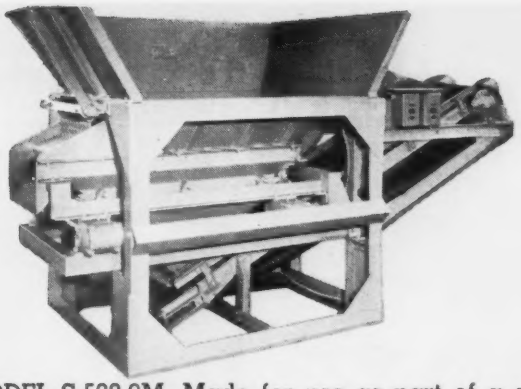
QUESTION Noticing a sketch of a small cupola in the June issue of FOUNDRY, we wonder if a unit like that could be lined with a castable refractory made of ground firebrick and a good grade of fireclay which would stand up for occasional use. We have been lining our furnaces for brass and aluminum with it. Could something be added to the fireclay and brick to make it more refractory? We have a 30-in. shell, and while some manufacturers make brick shapes, we have our own brick and clay, and would like to use them.

ANSWER While some cupolas are lined by ramming in plastic refractory mixtures, they are designed to meet the conditions encountered—such as high temperature and action of molten slag and iron—and we believe you will be much further ahead by purchasing a cupola ramming material than by trying to develop one of your own.

Although the ground fire brick and clay mixture serves satisfactorily for lining your brass furnaces, in the cupola the lining material, in addition to being subjected to much higher temperatures, is directly in contact with molten slag and iron—a condition which does not occur with the brass furnaces.

Possibly the materials you have on hand might serve satisfactorily for lining the cupola, and the only way to find out is to try them. Perhaps the addition of crushed ganister (⅜-in. size) to the ground firebrick might be of value. The addition of finely crushed coke, carbon or graphite also is reported to aid in reducing slag attack.

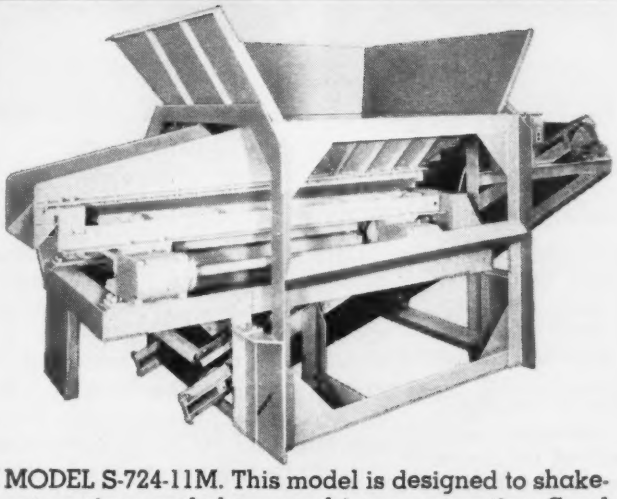
"mechanization" YOU can afford!



MODEL S-522-9M. Made for use as part of a centralized sand system. The large open-sided hopper directs the complete charge from a front end loader onto a Royer Shake-Out where the large scrap is riddled out. Magnetic separation removes the fine scrap; sand is discharged into a Royer Sand Separator and Blender or the skip hoist to a muller.

The new series of Royer "Scrap Control", with its versatility of application, can supply a varied amount of mechanized casting removal, sand cleaning and conditioning. Here is a unit that puts "mechanization" within the reach of all . . . supplying the benefits of labor saving and production line operation at lowest possible cost.

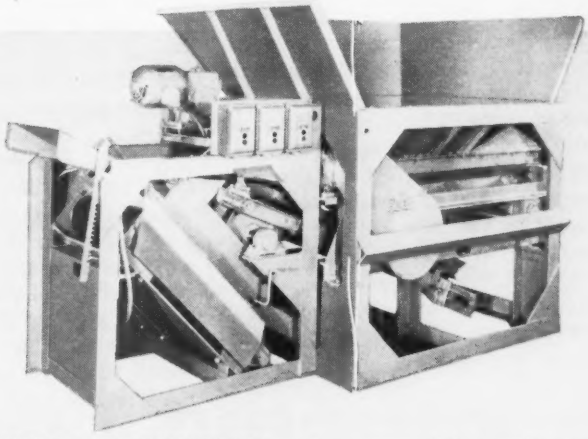
Take this opportunity to cut down the high cost of hand labor in your sand conditioning operations. Verified results show up to 50% of a night crew released for other work, with the damage by tramp iron to pattern equipment eliminated and scrap losses reduced 75%. We will be glad to study your operation and recommend the proper equipment . . . no obligation, of course.



MODEL S-724-11M. This model is designed to shake-out castings and clean sand in one operation. Sand and castings scooped from the molding floor are charged into the hopper and onto a Royer Shake-Out. Castings are discharged at one end at proper height for feeding a table or conveyor where they can be sprued and sorted. Completely cleaned sand is discharged at the opposite end.

CHECK THESE FEATURES

1. **Up to 60 tons of clean sand per hour.**
2. **No pits . . . no excavating.**
3. **Low receiving hopper.**
4. **High sand and scrap discharge.**
5. **Rugged Shake-Out utilized as a riddle.**
6. **No screens to clog.**
7. **Easily made portable.**
8. **Readily relocated.**
9. **Four-sided 5 ton capacity hopper available for all units.**



MODEL S-522-5MR. Here is a complete packaged sand cleaning and conditioning unit. Fed by front end loader, the sand is cleaned by a Royer Shake-Out and magnetic separator, tempered and given final preparation by a Royer Sand Separator and Blender. Unit can be moved by overhead crane, setting up the conditioning operation where desired.

Foremost in Sand ROYER *Conditioning Equipment*

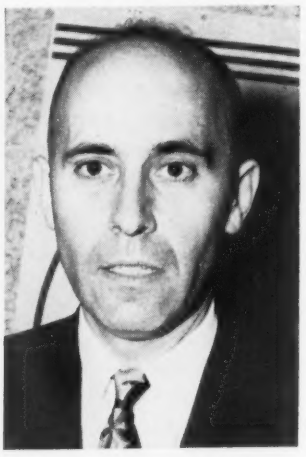
ROYER FOUNDRY & MACHINE CO. 159 PRINGLE ST. KINGSTON, PA.

Men of Industry

KARL L. LANDGREBE JR.
. . . Wheland Co. v. p.

JOHN H. KAUFFMAN
. . . joins Natl. Engineering

CLYDE B. JENNI
. . . heads Castings Branch



HANS J. HEINE
. . . joins ASM staff

KARL L. LANDGREBE JR. has been appointed vice president in charge of foundry operations, the Wheland Co., Chattanooga, Tenn. He is a graduate of Cornell University and has held various executive positions since joining the Wheland company in 1946. Previously he was associated with Ford Motor Co. in Dearborn, Mich.

Howard J. Brandt, formerly plant metallurgist in the plaster cast department, Detroit Works, Aluminum Co. of America, has been transferred to the Cleveland Works as sand foundry foreman. **Edward Merkling** has returned to the personnel department in Cleveland, following two years of military service. **Robert D. Walser,** formerly in the ingot plant industrial engineering department, Cleveland, has become a staff engineer in the works engineering department.

John V. E. Hansen has been named administrative assistant to the director of research, National Research Corp., Cambridge, Mass. A graduate of Polytechnic Institute of Brooklyn, until recently he was associated with Jackson & Moreland, Boston. Previously he was with Takamine Laboratory Inc., Clifton, N. J., and Allied Chemical & Dye Corp., New York.

Lewis I. Day, controller, Buckeye Steel Castings Co., Columbus, O., was recently elected to membership in the Controllers Institute of America, New York.

John H. Kauffman, for the last 7 years foundry engineer, Studebaker Corp., South Bend, Ind., was appointed assistant chief engineer, foundry engineering department, National Engineering Co., Chicago. A graduate of University of Michigan, he was previously associated with Ohio Brass Co., Mansfield, O., Albion Malleable Iron Co., Albion, Mich., and Sealed Power Corp., Muskegon, Mich.

Clyde B. Jenni has been appointed chief of the Castings Branch, Iron and Steel Division, Business and Defense Services Administration, Washington. He is succeeding **Roger F. Waindle,** president, WaiMet Engineering Co., Waban, Mass. Mr. Jenni is on loan from his position as chief metallurgist, General Steel Castings Co., Eddystone, Pa. Widely known in the steel castings industry, he is a member of the executive committee of the Steel Division, AFS, and is active in the Steel Founders' Society of America and the American Society for Testing Materials.

David Matter, formerly foundry research metallurgist, Manufacturing Research Division, International Harvester Co., Chicago, has been appointed manager of iron foundry service, Ohio Ferro-Alloys Corp., Canton, O.

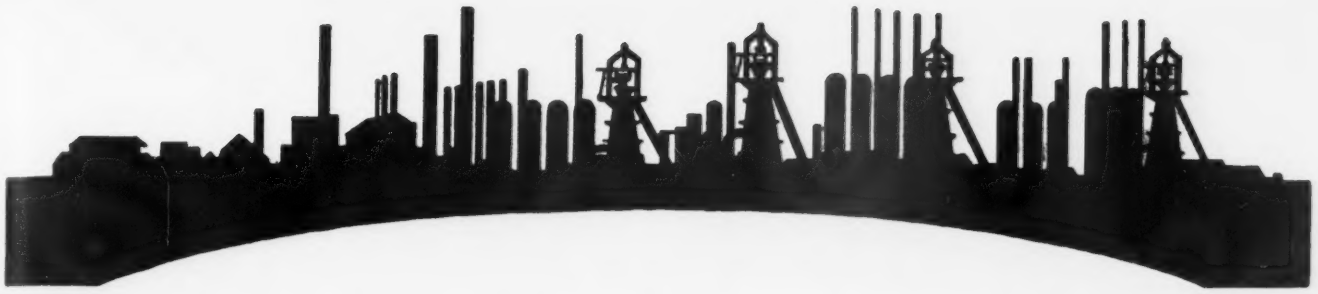
John R. Kahler, secretary-treasurer, Sandusky Foundry & Machine Co., Sandusky, O., was named secretary of the Toledo Control, Controllers Institute of America, New York.

Hans J. Heine, recently technical director, American Foundrymen's Society, has been appointed to the staff of the American Society for Metals at its Cleveland headquarters. Prior to joining the AFS in 1953 he was chief metallurgist, Rockwell Mfg. Co. Mr. Heine received his engineering training at the Institute of Technology in Berlin. Following postgraduate work at Carnegie Institute of Technology he spent five years in a metallurgical capacity with the Aluminum Co. of America. He served as captain in the Ordnance Department during World War II.

John Woodward was appointed assistant general manager, Scott-Atwater Mfg. Co., Minneapolis. He was formerly works manager, McCulloch Motors Corp., Los Angeles, which merged with Scott-Atwater earlier this year. **Byron E. Smith,** until recently assistant plant engineer with McCulloch Motors, was named plant engineer for Scott-Atwater.

Edward H. Fiesinger Jr., formerly assistant superintendent, has been appointed superintendent of the iron foundry, Crouse-Hinds Co., Syracuse, N. Y., succeeding **Stephen Blackford,** who retired after 39 years with the company. Mr. Fiesinger joined the company ten years ago.

H. Monteith Albers was elected president, Kensington Steel Co., Chicago succeeding **Eugene C. Bauer Jr.,** who will continue as Kensington's



Fidelity to These Aims Has Steadily Increased Sales of WOODWARD IRON

Throughout its 74-year history, Woodward has focused its efforts and geared its full facilities to these two aims:

- **Manufacture of Uniform, Quality Pig Iron**
- **Maintenance of Efficient Service to Its Customers**

During the past six years alone, Woodward has invested more than $14,000,000 in capital improvements, designed to increase output, further improve the quality of its iron, and render still better service to its growing list of foundry friends.

Woodward invites inquiries from foundries interested in uniform, quality merchant iron—malleable or foundry grades.

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MEN OF INDUSTRY

KARL T. RINDERLE
. . . joins Westover Corp.

WALTER GIELE
. . . AFS Chapter Chairman

ROBERT P. SAYERS
. . . Link-Belt district mgr.

ROBERT P. SCHAUSS
. . . Chicago Chapter pres.

chairman of the board, and as executive vice president of Poor & Co., Chicago, the parent company. **Roy W. Sergeant** was named vice president-controller, and **Robert E. Mitchell,** treasurer, of Poor & Co.

Karl T. Rinderle recently joined Westover Corp., Milwaukee, as field engineer. Mr. Rinderle received his engineering training at Carnegie Institute of Technology and for 19 years was associated with Brown Industries Inc., Sandusky, O., where he served as works engineer, foundry superintendent, and for the past 12 years as vice president of operations.

Francis D. Lordi, for the past year supervisor of manufacturing for the precision casting foundry, Applied Research and Development Laboratory, General Electric Co., Schenectady, N. Y., was appointed a development engineer in the laboratory's foundry department. He joined the company following graduation from Columbia University in 1950, and in 1953 became a development foundry project engineer in the foundry department, in charge of investment casting development.

Dr. Paul V. Faragher, chief of the specifications section, metallurgical division, Aluminum Co. of America, Pittsburgh, has retired after 37 years with the company. He was graduated from University of Kansas, and then studied at University of California and at Massachusetts Institute of Technology. He joined Alcoa in 1919 as chief of the experimental laboratory.

Dr. Gordon E. Zima has joined the staff of Bayonne Research Laboratory, International Nickel Co., Bayonne, N. J., as a research metallurgist, where he will work in the field of high-temperature metallurgy. A graduate of California Institute of Technology, where he also received his master's degree and doctorate, he has been associated with the Jet Propulsion Laboratory there since 1946.

Walter Giele, chairman of the Philadelphia Chapter of the AFS for 1956-57, since 1916 has been engaged in consulting practice, specializing in foundry plants and equipment. He was graduated from Cornell University and took postgraduate work at New York University and University of Pennsylvania. Vice chairman of the Philadelphia Chapter last year, Mr. Giele will serve as general chairman of the East Coast Regional Foundry Conference in Philadelphia in April.

Robert P. Sayers was appointed manager of the Duluth district office, Link-Belt Co., Chicago, succeeding **J. E. Morrison,** who will concentrate on engineering and product development. Mr. Sayers was graduated from University of Alabama and since 1945 has been a district sales engineer in the Chicago sales office. Previously he served in the shop, engineering and sales departments of Link-Belt's Pershing Road plant in Chicago.

Gordon M. Piotrowski was appointed a district application engineer in the Chicago office, Clark Controller Co., Cleveland. A graduate of University of Michigan, he has spent the past 6 years as an electrical engineer in the company's applied engineering department.

Dr. Donald S. Clark, professor of mechanical engineering, California Institute of Technology, Pasadena, Calif., has been nominated as president of the American Society for Metals for 1956-57. **George M. Young,** technical director, Aluminum Co. of Canada Ltd., Montreal, is the vice presidential nominee. **C. H. Lorig,** assistant director, Battelle Memorial Institute, Columbus, O., continues as treasurer, and **W. H. Eisenman,** ASM National Headquarters, Cleveland, as secretary.

Robert P. Schauss, president of the Chicago Chapter of the AFS for 1956-57, is Chicago manager, Werner G. Smith Inc., Cleveland. Following graduation from Case Institute of Technology, he joined National Malleable & Steel Castings Co., Cleveland, and became superintendent of its malleable foundry in Chicago. Later he was foundry engineer, Illinois Clay Products Co., Chicago, until 1951 when he joined Werner G. Smith Co. Mr. Schauss is a former director of the Chicago Chapter and was its vice president last year. He has also served as a member of various committees of the national organization of the society.

Alexander B. Paulsen was named chairman of the board of directors, and **Bernard N. Ames,** president, Columbian Bronze Corp., Freeport, N. Y. Mr. Ames was associated with New York Naval Shipyard, Brooklyn, for 13 years as head of the casting development and foundry practices section. In 1954 he became general manager, Doran Manganese Bronze Co., Brooklyn, subsidiary of Columbian Bronze, and was named vice president of Columbian early last year.

Lewis J. Pentland was appointed district sales manager in New York, for Durez Plastics Division, Hooker Electrochemical Co., Niagara Falls, N. Y. With the division since 1929

Chosen by AMERICAN HOIST & DERRICK CO.

LEADING CRANE MANUFACTURERS

for their entry into foundry electric furnace melting

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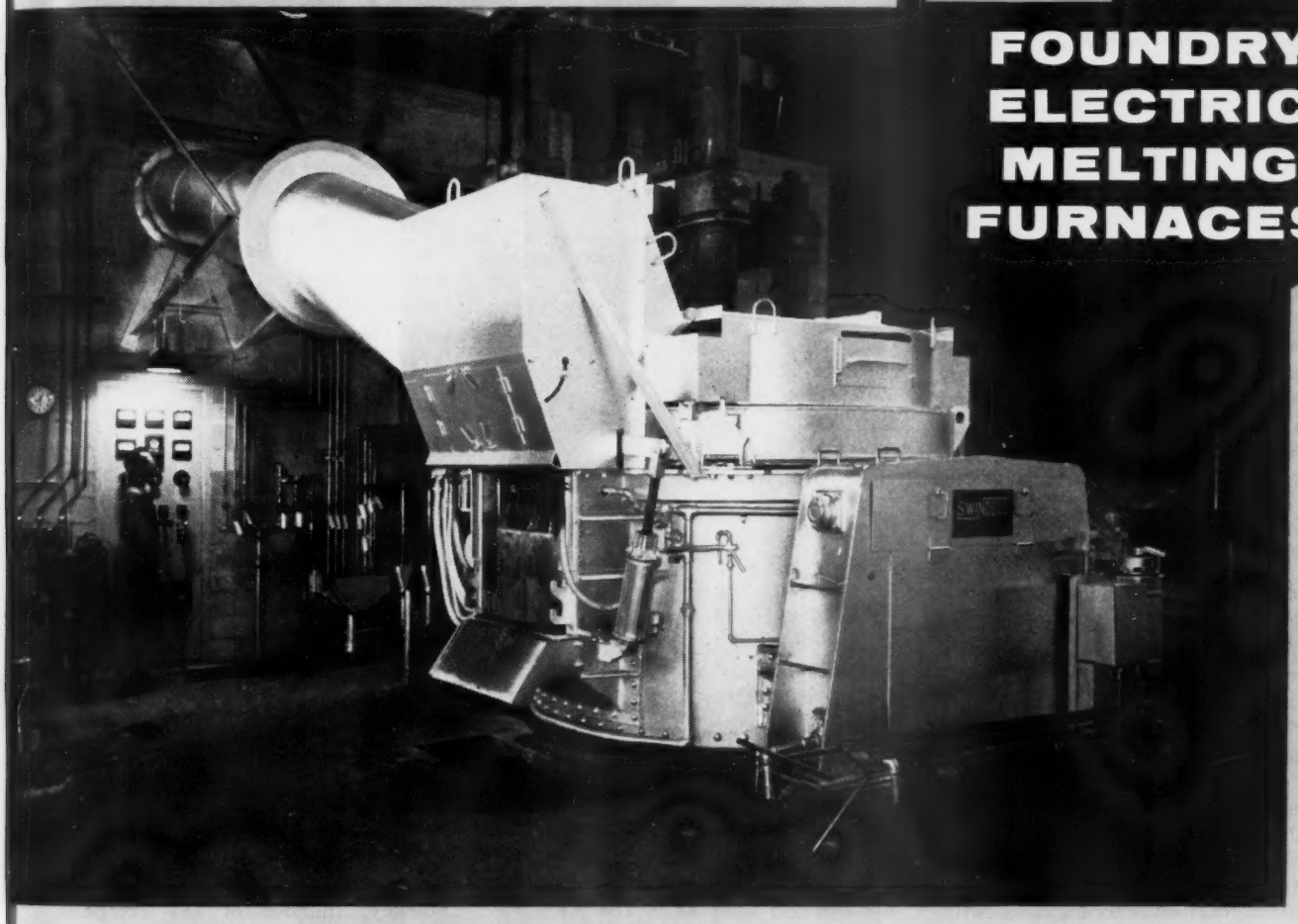
FOUNDRY ELECTRIC MELTING FURNACES



SWINDELL *Electrode Hoist Mechanism*

—ANOTHER SWINDELL QUALITY FEATURE

SWINDELL Electric Melting Furnaces for foundry service provide the productivity, low maintenance and long useful life built-in by genuine steel mill design and construction by steel mill melting furnace specialists. Write for a consultation.

When the leading crane manufacturer chooses SWINDELL, you can be sure the electrode hoist has passed with honors! Typically Swindell in quality, the hoist employs a motor reducer with integral cable drum, mounted close to the work for shortest cable length. This results in fast, accurate response, eliminating long-cable stretch, elaborate equalizer systems, and costly foundation cable channels. There is no hydraulic system to cause leak hazards or high maintenance—the Swindell hoist is electro-mechanical throughout, providing positive, split-second regulation of electrodes at all times. ● Let us detail the facts for you!

WRITE for your copy of the latest Swindell Electric Melting Furnace Catalog—sent promptly on request.

SWINDELL-DRESSLER *Corporation*

DESIGNERS AND BUILDERS OF MODERN INDUSTRIAL FURNACES

PITTSBURGH 30, PA.

Circle 640 on Inquiry Card—Page 219

MEN OF INDUSTRY

D. B. REEDER
. . . Electromelt Western mgr.

H. J. PFEIFER
. . . becomes San Francisco mgr.

F. W. HANSON
. . . Houston sales engineer

S. L. JACKSON
. . . New York district mgr.

he was in the New England sales department since 1935. **Evan E. Graham** was named district sales manager for the division's sales in California. He has been a West Coast sales representative for Durez since 1940. **Henry B. Puff,** appointed Chicago district sales manager, joined the division in 1946 and has been engaged in Chicago district sales since 1947.

D. B. Reeder was appointed western manager of metallurgical service, Electro Metallurgical Co., division of Union Carbide & Carbon Corp., New York. He joined the company in 1929. **H. J. Pfeifer,** former manager of the Houston, Tex., district, has succeeded Mr. Reeder as San Francisco district manager. Mr. Pfeifer has been with the Electromet sales organization since 1937. **F. W. Hanson** was appointed Houston district sales engineer. A graduate of Northeastern University, Mr. Hanson has been a metallurgical service engineer with the company since 1939. **S. L. Jackson,** formerly Los Angeles district manager for Electromet, was named New York district manager. He was graduated from Colorado School of Mines and has been with the company since 1942.

David E. Neustadt, until recently general sales manager, W. W. Sly Mfg. Co., Cleveland, has joined National Metal Abrasive Co., there, as vice president-marketing director. Mr. Neustadt, a graduate of Ohio State University, has spent many years in the foundry equipment field, specializing in steel and foundry cleaning systems.

James M. Rooney, formerly associated with Unistrut Products Co., Chicago, was named abrasive engineer, Bay State Abrasive Products Co., Westboro, Mass., in the southern district, with headquarters in Birmingham.

F. W. Kellam, elected chairman of the Ontario Chapter of the AFS for the current year, has been metallurgical engineer since 1951 in the sales-service division, Electro Metallurgical Co., Division of Union Carbide Canada Ltd., Welland, Ont. A graduate of University of Toronto, following military service in the Royal Canadian Engineers, he was metallurgist, Wm. Kennedy & Sons Ltd., Owen Sound, Ont., for 5 years. Mr. Kellam was vice chairman of the chapter last year.

James M. Wilson, for 39 years a field engineer in the Pittsburgh office, Metal & Thermit Corp., Rahway, N. J., has retired. He will continue as a consultant until the end of the year. Mr. Wilson joined the company in 1917 when the Pittsburgh office was opened. A graduate of Carnegie Institute of Technology, he pioneered many of the heavier applications of Thermit welding.

Marquand J. Anderson was elected president, Aro Equipment Corp., Bryan, O., succeeding **John C. Markey,** founder of the company, who has become chairman of the

DAVID E. NEUSTADT
. . . National Metal v. p.

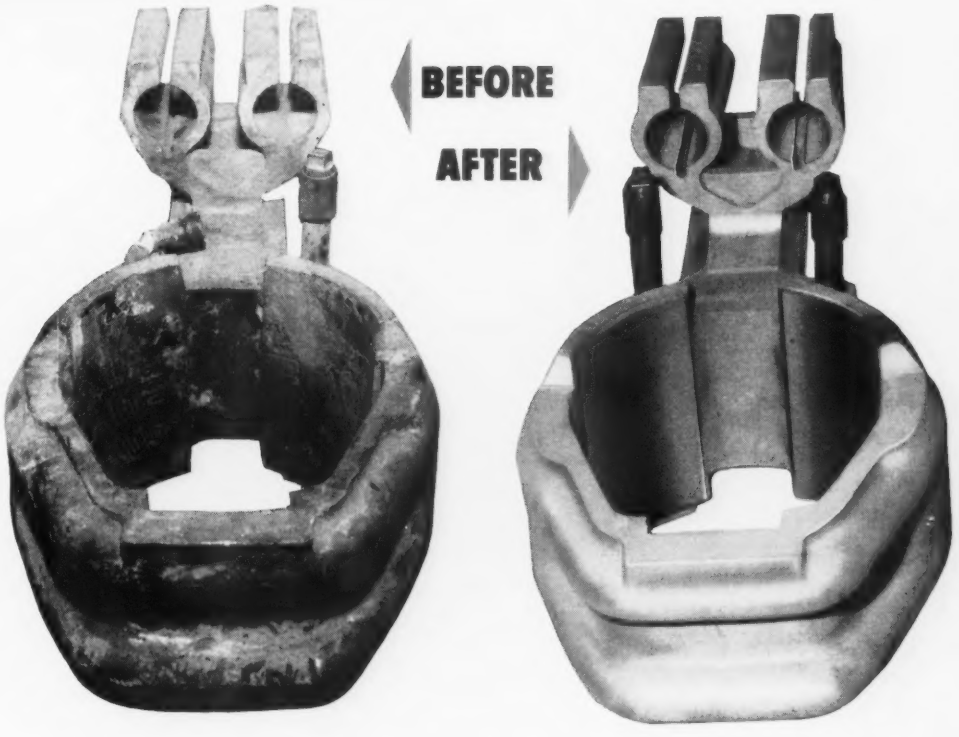
JAMES M. ROONEY
. . . Bay State Abrasive sales

F. W. KELLAM
. . . heads Ontario Chapter

MARQUAND J. ANDERSON
. . . pres., Aro Equipment Corp.

Rebuild ELECTRODE HOLDERS

at a fraction of replacement costs...



Costly electrode holders, bus tubes and cable clamps no longer need be discarded when they become badly burned, pitted or scarred. These pieces of equipment may be restored to a condition corresponding to the original drawings and specifications at a fraction of the cost of a replacement unit. Wilson Welding Company's new method, using a patented process of fusion welding of copper and copper alloy, now makes possible the repair and rebuilding of holders, bus tubes, bus bars or other burned or damaged copper component parts on all types and makes of electric arc melting and smelting furnaces.

The photographs above show, in a graphic manner, the results obtained from an electrode holder so badly damaged that it was thought to be unsalvageable.

Repair prices are based upon the amount of labor and material cost involved.

All repair work is guaranteed to produce a finished product comparable in every respect to the original.

Your inquiry will receive prompt attention.

W W CO INC

Wilson Welding Company, Inc.

COPPER AND COPPER ALLOY WELDING

221 HIGH STREET
ALTIZER ADDITION
BOX 1634
HUNTINGTON
WEST VIRGINIA

Circle 641 on Inquiry Card—Page 219

JACK H. SCHAUM
. . . becomes AFS editor

EDWARD S. COE JR.
. . . becomes division mgr.

THEODORE BOLTON
. . . becomes branch mgr.

ALEXANDER D. BARCZAK
. . . NEO chapter chairman

board of directors. Mr. Anderson, with the company for several years, served previously as assistant to the president and recently as vice president-general manager.

Jack H. Schaum, recently with the experimental foundry department of the National Bureau of Standards, Washington, has been appointed editor of *Modern Castings*. He succeeds Herbert F. Scobie, who has become field manager for the Non-Ferrous Founders' Society. Graduated from Massachusetts Institute of Technology in 1940, Mr. Schaum's earlier connections included Lewis Foundry & Machine Co., Pittsburgh, Babcock & Wilcox Co., Barberton, O., the Bureau of Mines and Naval Research Laboratory, Washington.

R. F. Teeling was named regional manager of a new eastern sales region, recently established at 500 Fifth Ave., New York, by Manhattan Rubber Division, Raybestos-Manhattan Inc., Passaic, N. J. Mr. Teeling will co-ordinate activities of the New York, Philadelphia and North Jersey districts. He was manager of North Jersey sales since 1948. **J. T. M. Frey,** formerly assistant manager of the New York branch, is manager of the North Jersey district. **Stewart Monroe** is manager of the New York district, and **Frank McBrearity** manager of the Philadelphia district.

Edward S. Coe Jr., vice president and a director, Farrel-Birmingham Co., Ansonia, Conn., was named general manager of the company's Consolidated Machine Tool Division, Rochester, N. Y., succeeding **Lester D. Chirgwin,** who was granted leave of absence until his retirement at the end of the year. Mr. Coe was formerly assistant to the president and manager of the company's Connecticut plants. **Graham Hassard,** formerly superintendent of foundries, was named to succeed Mr. Coe in the latter capacity. **Richard D. Mace** was appointed manager of foundries and **G. Wells Eighmy Jr.,** New England sales representative, takes the post vacated by Mr. Mace. **Gould C. Christensen** will handle company sales in the lower Michigan peninsula.

Theodore Bolton was appointed Cleveland manager, Chicago Wheel & Mfg. Co., Chicago. He has been engaged in the engineering and purchasing of grinding and abrasive products for a number of years.

J. J. Fitzgibbon was appointed foundry product manager, International Nickel Co., New York. Other appointments include the following: **E. M. Flanagan,** copper and brass product manager; **C. S. Newmarch,** stainless steel product manager; **J. T. Stewart,** welding product manager; **C. H. Swan,** assistant welding product manager; and **T. P. Moore,** assistant auditor.

Frank W. Glaser, executive vice president-general manager, Alloy Precision Castings Co., Cleveland, subsidiary of Mercast Corp., New York, was appointed a director of Mercast (Great Britain) Ltd., London.

H. H. Kieckhefer, for several years assistant sales manager, Wheelco Instruments Division, Barber-Colman Co., Rockford, Ill., was appointed sales manager. A graduate of University of Wisconsin, Mr. Kieckhefer has been engaged in engineering and selling automatic controls for more than 20 years.

Alexander D. Barczak, chairman of the Northeastern Ohio Chapter of the AFS for the current year, since 1948 has been plant manager, Superior Foundry Inc., Cleveland. While attending University of Detroit he did co-operative work at Chevrolet Gray Iron Foundry, Saginaw, Mich. Following graduation he remained at Chevrolet where he was engaged in sand control problems and work in the laboratory. In 1942 Mr. Barczak joined Bardes Forge & Foundry Co., Cincinnati, where he later became plant manager and vice president. He was active in the Cincinnati Chapter of the AFS prior to moving to Cleveland.

Morris G. Munson was appointed southern regional manager, American Air Filter Co., Louisville. **J. M. Osborne** was named southern regional supervisor of the company's unit ventilator and heating and ventilating product departments. They will be located in the St. Petersburg, Fla., office.

George C. Wilsher, since 1945 head of the engineering department, Holcroft & Co., Detroit, has been named vice president in charge of engineering. A graduate of Detroit Institute of Technology, Mr. Wilsher joined the company in 1925.

Donald Saunter was named director of production and purchasing, Dodge Mfg. Corp., Mishawaka, Ind. Mr. Saunter joined the company in 1937. For the past 5 years he has been handling special assignments for the production department.

Herbert P. Strack Jr. has joined Coles Cranes Inc., Joliet, Ill., as East Coast regional manager. A graduate of University of Maryland, he has been engaged in material handling sales in Baltimore.

Makes it possible to x-ray thicker sections –

cuts gamma ray exposure time

Read what the new Kodak Industrial X-ray Film, Type AA, does for you:

- Reduces exposure time—speeds up routine examinations.
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Whatever your present radiographic facilities, they'll do more work for you with Kodak's new Industrial X-ray Film, Type AA.

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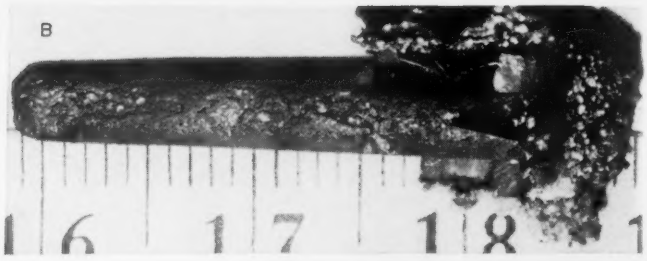


Fig. 1—From top left to lower right: *A*—Plug in small tube with part of tube remaining. *B*—Same view, but with plug removed. Scale in millimeters. *C*—End view of same plug. *D*—Plug in larger tube

STEEL PENETRATION
—Some Further Observations

By R. C. EMMONS and J. B. JONES
University of Wisconsin, Madison, Wis.
and J. R. BACH
Falk Corp., Milwaukee

IN FOUNDRY for April, 1955, we reported some work done on penetration under the title "Steel Penetration." A recent additional test is pertinent to that discussion in that it places the emphasis on moisture as the cause of breakdown of the penetrating carbonyl. This gives to water a dual role both causing the formation of carbonyl and triggering its destruction.

The Experiment—Two silica tubes were placed in the sand, one end near the face (½-inch back), the other end outside the mold. To each a second silica tube was attached immediately after the pour, by rubber tubing. This second tube was heated rapidly to red heat and the gas was ignited to detect the flow, at the remote end. No iron was deposited in the tube as it would have been if the gases contained iron carbonyl. The silica tubes were removed before shaking-out and were found to contain a metal plug at the face end (Fig. 1).

Either the face end of the tube was penetrated by molten steel which had flowed through some sand first, or the carbonyl met conditions in the tube which broke it down, or both. The steel contained 0.8 per cent manganese, which does not form a carbonyl. Manganese is volatile above its melting point (1260°C), however, and could be present as a vapor after the sand was heated.

Both plugs and a chip from the riser were analyzed chemically by K. R. Klumb. His results are: Riser 0.75 per cent Mn, plug No. 1 0.29 per cent Mn, plug No. 2 0.29 per cent Mn. This suggests either a combination of metal flow and gas flow, as was reported earlier, or a combination of carbonyls and volatile manganese, the manganese being restricted to the later, higher temperature flow and therefore lower in amount.

There is undoubtedly significance in the identical manganese of the two plugs, which were almost on opposite sides of the mold and were in tubes of different size. This identity is more easily explained as the product of gases of constant composition than it is of one portion of gas deposit and another portion of molten metal equal in amount in both plugs.

Penetration Conditions — Our understanding of the conditions of penetration are these: At the face where the temperature is highest, moisture in the sand is partly broken down and partly driven back from the face to condense again in the cooler parts of the sand. The gases emitted from the tubes included considerable water vapor, some of which condensed. At the face, the breakdown created the carbonyl-producing gases, as already reported, in an environment which early loses its moisture. The moisture in moving back carries with it silica which it deposits as cristobalite largely, back from the face. This transfer opens up the sand for penetration.

Zircon and olivine, which are silicates rather than silica, are not amenable to ready breakdown and are better able to resist penetration in that their sands do not open up. The water collects in an advancing wave back from the face. It appears that this concentration is breaking down the carbonyl—a disturbing fact since it robs the operator of an easy method of preventing penetration by providing gas escape channels.

Referring back to the original paper, a brief statement was made about green sand—"It seems to have its own protection" and "Possibly moisture destroys the effectiveness of iron carbonyl also." These statements appear now to be confirmed. A small amount of moisture which can be driven away by the heat at the face does two things——in part

Circle 643 on Inquiry Card→

WOODEN CORE BOXES!

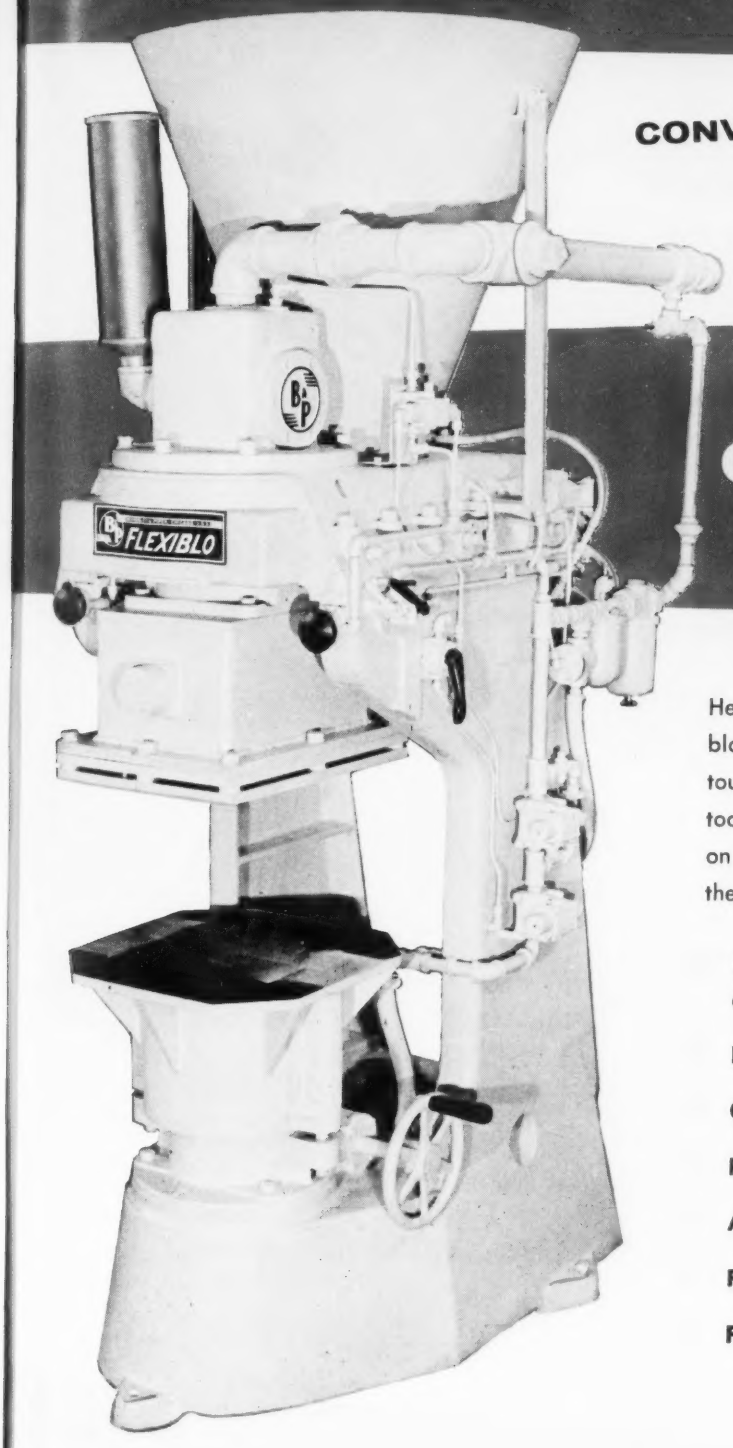
METAL CORE BOXES!

METAL-REINFORCED CORE BOXES!

VERTICALLY-SPLIT BOXES!

HORIZONTALLY-SPLIT BOXES!

OPEN BOXES!



CONVENTIONAL CORE SANDS!

HIGH STRENGTH CORE SANDS!

MOLDING SANDS!

all blown on the CB12C FLEXIBLO *with Agitator*

Here's the new standard of the industry in medium size core blowers. The new CB12C Flexiblo *with agitator* handles the toughest core sand with ease . . . blows all types of core boxes too. Even well designed wooden core boxes can be handled on the Flexiblo. Look at some of the CB12C's features and then send for Bulletin No. 5010 for full information.

Dependable Flexiblo air-economy . . . minimum air consumption

Full 30 pound blown core capacity

Completely-automatic push-button controlled cycle

Rugged cast steel frame—strongest in the industry

Air-on-oil, automatic side clamp unit

Full 6½-inch, adjustable draw

Full 12 x 20 inch sand magazine

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BEARDSLEY & PIPER
FOR BETTER METHODS

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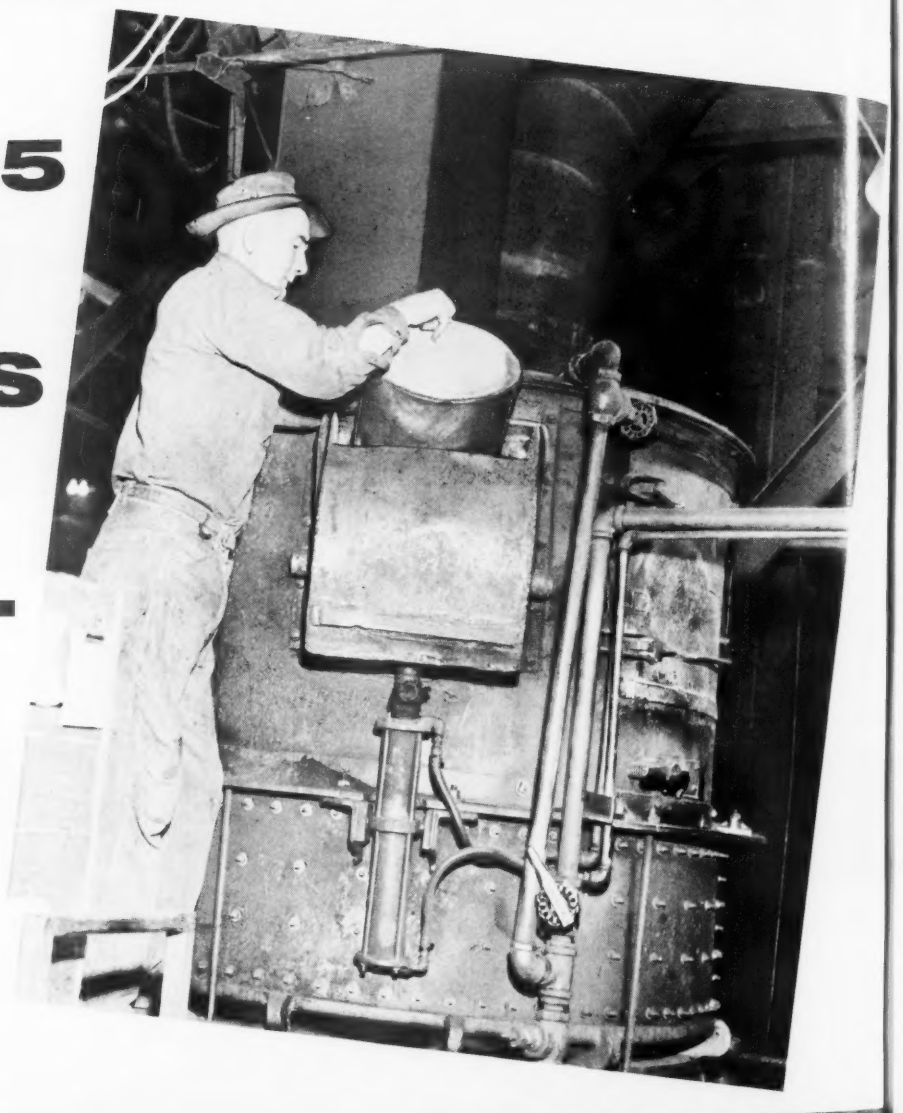
MEMBER FEMA

THE WORLD'S LARGEST EXCLUSIVE MANUFACTURER OF FOUNDRY MACHINERY

435 BATCHES A DAY... EVERY DAY!



a vital segment of a foundry depends on this "60A" Speedmullor for all of its molding sand

When the chips are down and real dependability is required . . . when an entire foundry depends on a single mullor . . . there's no other mixer that mulls hour after hour and shift after shift like the Speedmullor.

The three-shift operation of a Model "60A" Speedmullor at General Electric, Elmira is just one example. There, 435 batches of closely controlled, synthetic all-purpose sand are mulled to maximum physical properties daily. Batch size is 1200 pounds and the total time cycle for complete mulling is 90 seconds. This "60A" is just one of the Speedmullors used in the foundries of General Electric at Elmira.

If you, too, need dependability and capacity, write now for Bulletin No. 1220 . . . it will give you full information.

LOOK TO BEARDSLEY & PIPER FOR BETTER METHODS

MEMBER FEMA

THE WORLD'S LARGEST EXCLUSIVE MANUFACTURER OF FOUNDRY MACHINERY

it moves back and carries considerable silica with it to open up the sand for penetration, and in part it breaks down to initiate carbonyl formation. If moisture is more abundant, as in green sand, however, it exercises an inhibiting influence on carbonyl formation.

We also called attention in the text and illustrated in Fig. 7 the failure of carbonyls to break down at the immediate face, but we offered no explanation except to suggest that such metal as was at the face, in the sand, represented once molten steel rather than a carbonyl deposit. This thought also would appear to be confirmed by the new run. There is no cause for carbonyl breakdown at the immediate face from which the moisture has largely been driven, hence the weakness of the bond at the face.

What To Do—There seem to remain only limited means of preventing or reducing penetration, namely, to dry the sand before a pour—and this is both difficult and undesirable—or to use a sand which is a silicate, that will not open up by breaking down in a stream of hot water vapor.

An alternate suggestion for protection is this: Since the sand must be opened up to make effective penetration by either gas or liquid possible, and since the main transfer of silica from the face in the opening-up process is silica flour which alone has the surface area, possibly a substitute for silica flour may be used. The substitute should be a silicate or a substance which would not yield to breakdown under the influence of heated water vapor. Its volume in the sand would be less than that of the sand itself since it would be interstitial to the sand.

The details on the casting are: No. CC 18432—a pinion. Weight 1900 lb. Double heats No. 5 and No. 6—May 1, 1956. Chemical analyses—

	No. 5	No. 6
C	0.41	0.45
Mn	0.87	0.77
P	0.032	0.028
S	0.044	0.047
Si	0.45	0.40

Produces Investment Castings

Rimer Precision Casting Co. has been established in Waterville, O., near Toledo, to produce ferrous and nonferrous parts by the investment casting process. The firm has leased an 8000-sq-ft building in Waterville, and installation of machinery is under way. President R. M. Rimer previously was connected with investment casting firms in Cleveland and in Pasadena, Calif.

FOUNDRYMEN LIKE SAM!

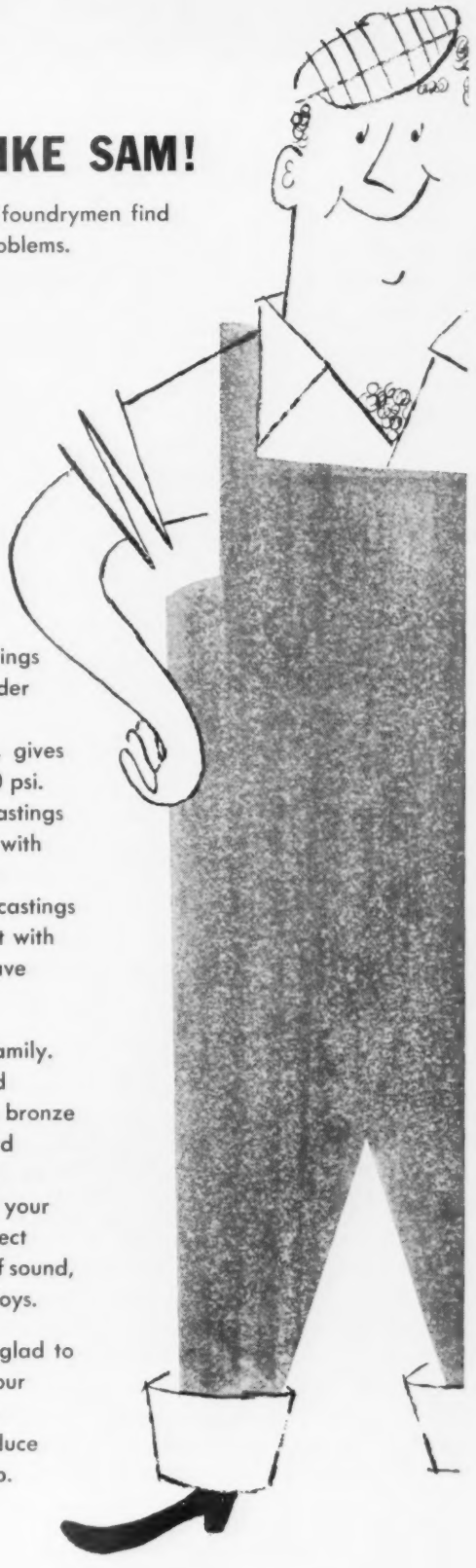
In these days of profit squeezes, foundrymen find that SAM has a key to their problems.

SAM represents

Silicon Bronze

Aluminum Bronze

Manganese Bronze



With these engineered bronzes, foundrymen make premium castings with properties that lead to a wider margin of profit. High-strength manganese bronze, for example, gives tensile strength as high as 125,000 psi. Heat-treated aluminum bronze castings have 120,000 psi tensile strength with high yield strength and excellent wear resistance. Silicon bronze castings combine ductility up to 50 percent with high strength. All these alloys have excellent corrosion resistance.

The SAM family is a Federated family. Federated has the experience and know-how to produce engineered bronze ingot exactly to specification. And Federated's vast store of foundry knowledge and experience is at your service to help you establish correct foundry practices and assure you of sound, profitable castings from these alloys.

Your Federated salesman will be glad to introduce you to SAM. Or call your nearest Federated office for more information on how you can produce premium castings with SAM's help.

Federated Metals

DIVISION OF AMERICAN SMELTING AND REFINING COMPANY
120 BROADWAY, NEW YORK 5, N. Y.
In Canada: Federated Metals Canada, Ltd., Toronto and Montreal

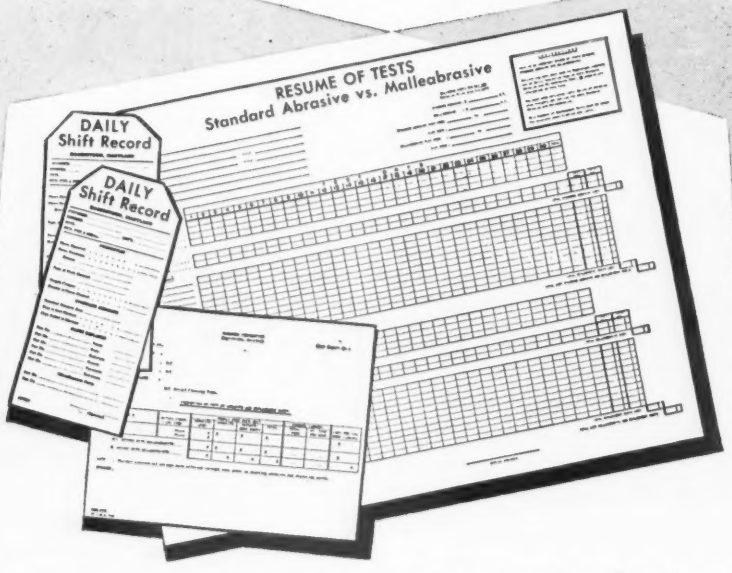
Federated first in the non ferrous field FMD

Aluminum, Anodes, Babbitts, Brass, Bronze, Die Casting Metals, Lead, Lead Products, Magnesium, Solders, Type Metals, Zinc Dust

Circle 644 on Inquiry Card—Page 219

MALLEABRASIVE®

—PUT THE "test" IN testing!



The only real test of any abrasive is its cost per ton of castings —obtained only by completely recorded use in production.

Malleabrasive was the first metal abrasive to be sold on the basis of recorded production performance in user's plants. The fact is, in its early stages of limited production, we sold it **only** to those who would agree to run recorded comparative tests. Yes, Malleabrasive really "put the test in testing" — really started all of this testing business!

Malleabrasive's economy has since been proven in hundreds of plants, so there are no restrictions on its sale any more. But— we do say, if extravagant claims and gimmick-guarantees are offered you that some other abrasives are cheaper for you than Malleabrasive, the only way to get the facts is to run recorded tests of both materials. Don't depend on generalities.

Samples of the test record forms used to establish Malleabrasive's economy will be sent on request. Write us.

THE GLOBE
STEEL ABRASIVE COMPANY
MANSFIELD, OHIO

Sold and recommended by
Pangborn Corp., Hagerstown, Md.

"NOW IN EASY TO HANDLE 50-POUND DOUBLE BURLAP BAGS"

Circle 645 on Inquiry Card—Page 219

GIFS Surveys Customers in Market Improvement Program

Gray Iron Founders' Society, Cleveland, is questionnairing castings buyers and product engineers in an effort to inform society members how they can serve these two groups better. The survey is the initial step in a nation-wide program designed to bring the level of marketing up to the present high level of technology in the gray iron castings industry.

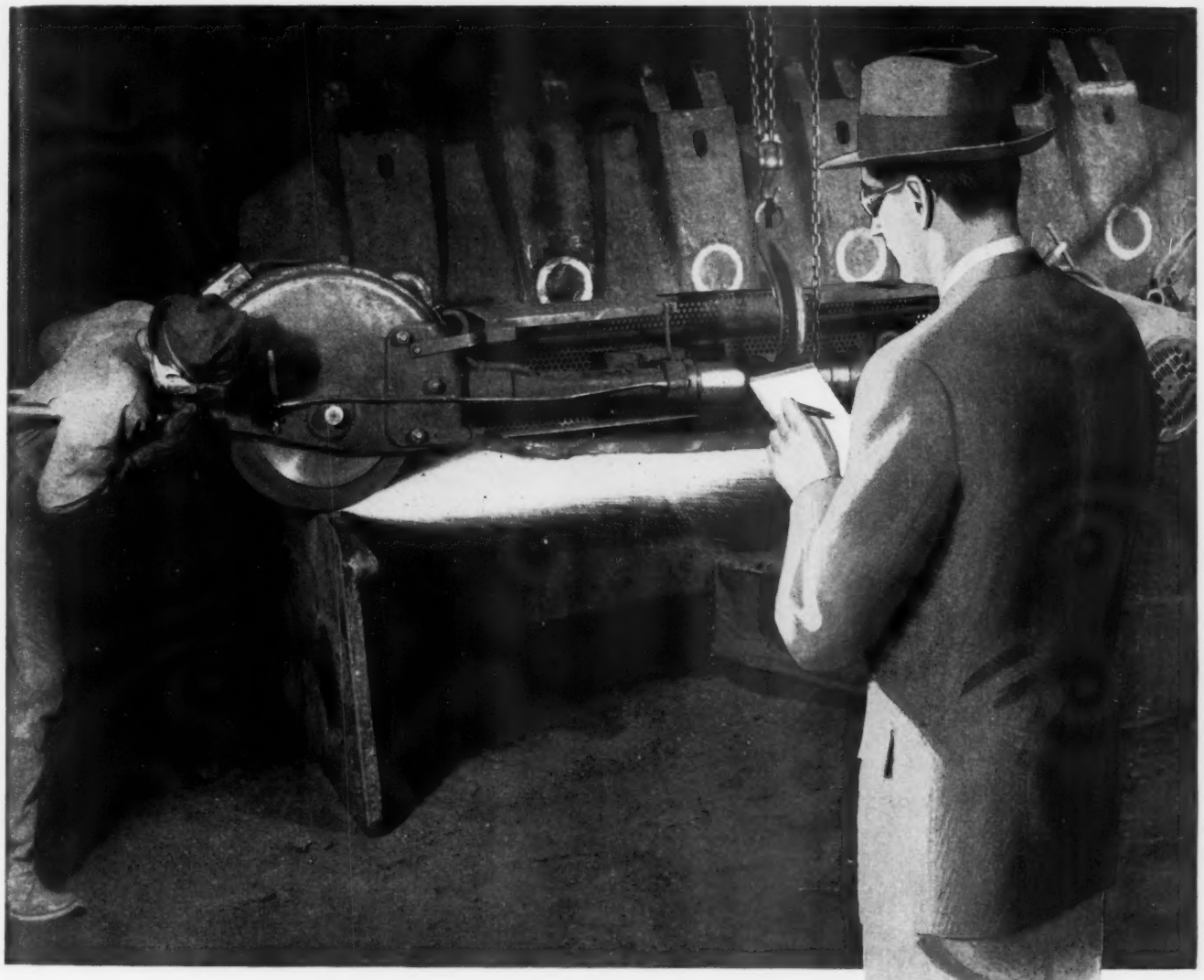
Castings buyers are asked to indicate how good a job gray iron foundries are doing and to show how service can be improved. They also are asked whether they like to have price quotations on a per piece or per pound basis and if they have difficulty in procuring any types or classes of iron castings. Another question deals with the relative importance of delivery, engineering help, price, quality and service in placing a casting order.

Questions to product engineers have been worded to show if engineers are familiar with the many improved properties of modern gray irons. They are asked if sufficient information is available on gray iron, what additional information they would like and if they would be interested in attending a one-day school on properties and design of castings. Engineers also are asked if there is a place for foundry assistance in the design or redesign of products to achieve improved quality or lower costs.

Bohn Moves Chicago Office

Bohn Aluminum & Brass Co., Detroit, has moved its Chicago district sales office to 6631 Stanley, Berwyn, Ill. It formerly was located in the Wrigley Building, Chicago.

"My feet are killin' me!"



Picture of a man about to cut GRINDING COSTS

He is checking up on the performance of grinding wheels in this foundry.

Is the rate of production high enough?

Are the wheels removing enough metal for the amount of wheel used?

Will the wheels stay sharp with a minimum of dressing?

Does the strength of the wheel provide a large safety factor under existing grinding conditions?

It is this man's job to find the answers to these questions, and to solve any grinding wheel problems.

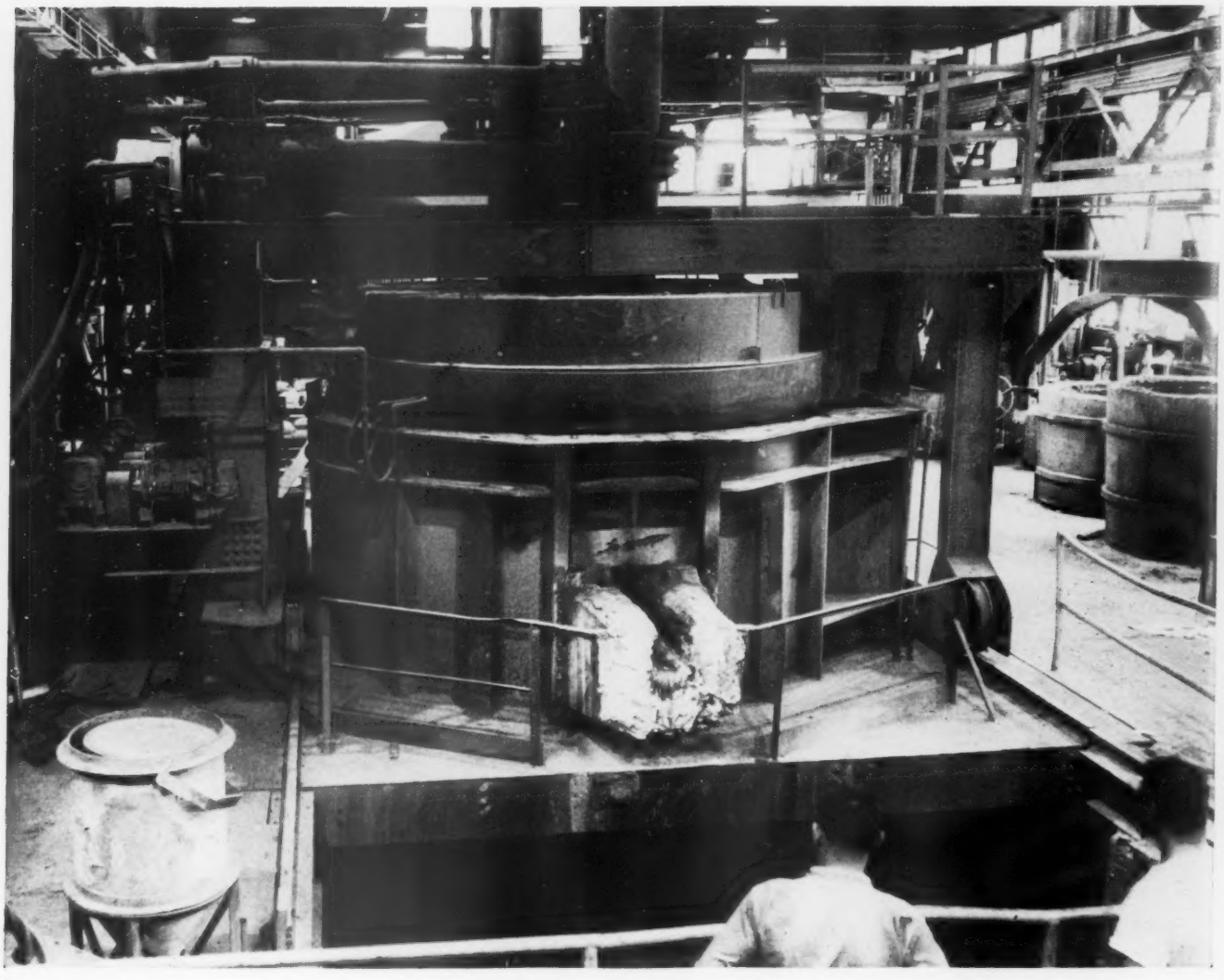
Wherever he goes, this United States Rubber Company grinding wheel field engineer commands respect because superintendents have learned to profit from his unmatched, practical on-the-job experience in solving these problems. For he has behind him years of field experience in wheel manufacturing and development. And the company he works for, "U.S.", has more than 91 years' experience in grinding wheels.

So, when you have a grinding wheel problem, arrange for his expert help—either through the "U.S." salesman who regularly calls on you, or by contacting Grinding Wheel Sales Dept., U.S. Rubber, 4300 New Haven Ave., Ft. Wayne 4, Ind.

Watch NCAA football, Saturday afternoon, NBC-TV

Mechanical Goods Division

United States Rubber



First induction stirrer is being installed on 50,000-lb capacity electric arc furnace in the General Electric Co. steel foundry, Schenectady, N. Y.

INDUCTION STIRRING

Improves Arc Furnace Steel

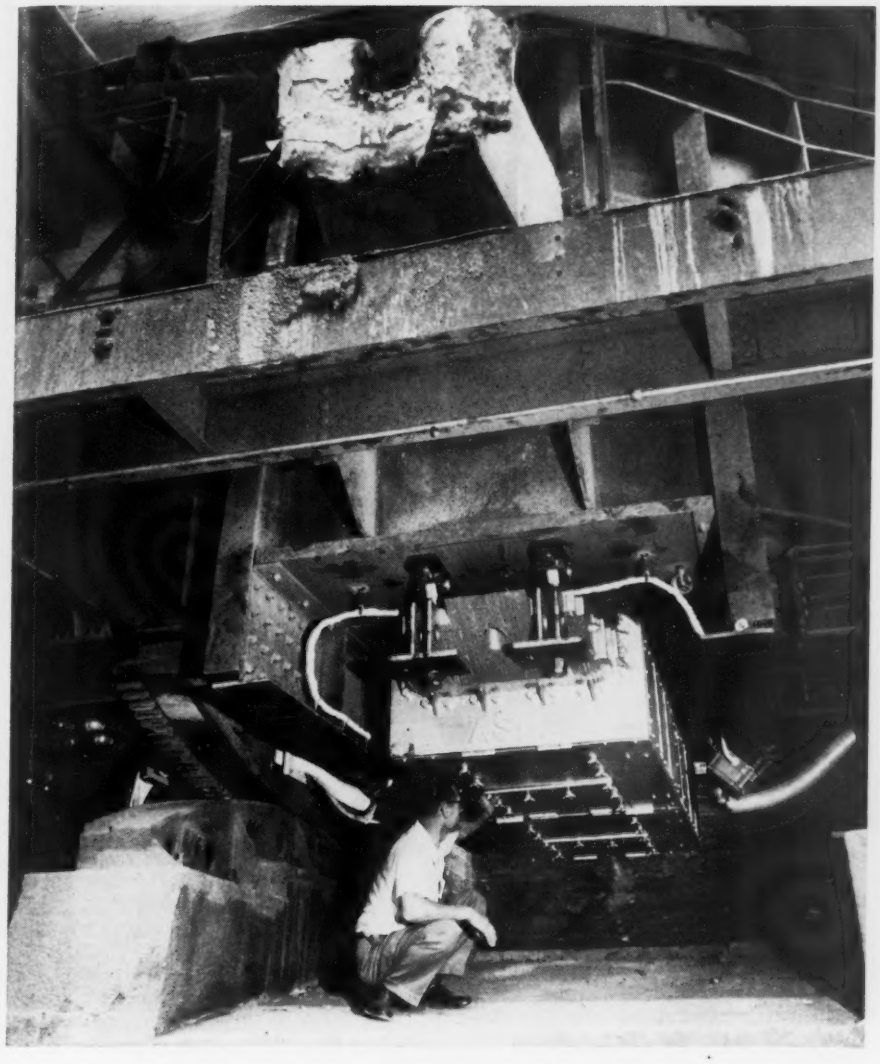
GENERAL Electric Co. is installing induction stirrers on two electric arc furnaces at its Schenectady, N. Y., steel foundry. The devices are intended to reduce the time necessary for refining the steel and to improve the quality of the metal.

While stirrers have been used in steel mills in the production of steel ingots, the Schenectady units represent a departure in steel casting practice. One of the stirrers, a Swedish invention, already has been installed and another will be placed in operation shortly on a second furnace.

In electric arc melting furnaces, static molten metal baths during the refining stage slow down metallurgical reactions. Alloying elements tend to stratify, and temperature distribution is uneven. Accurate sampling of the melt is practically impossible in the case of high-alloy steels. Various manual and mechanical methods are employed to obtain some mixing and stirring action of the metal, but in most cases the effects are not completely effective.

The induction stirrer is a water-cooled coil resembling a segment of the stator of a large two-phase induction motor. The stirring coils are encased in a steel container, or box, which is curved lengthwise only to fit the furnace contour.

The stirrer coil is suspended approximately 1 inch below a stainless steel furnace bottom. The flow pattern is achieved by the two-phase



View shows the induction stirrer housing located beneath the 50,000-lb electric arc furnace which produces a rolling movement in the bath

Two General Electric Co. facilities field men discuss layout plans of the main control board for the induction stirrer units

Two separate water systems, one a standby, are used to cool each furnace and its associated equipment. Cooling apparatus is located above the main control room

winding being excited by alternating currents of low frequency.

The low-frequency currents in the stirrer are produced by a two-phase generator driven by an induction motor. The traveling magnetic field induces eddy currents in the molten bath of metal. The magnetic field associated with these eddy currents reacts with the excitation field, thus creating a stirring force which moves the molten metal in the furnace across the hearth bottom and upward and sideward in conformity to its hemispherical shape.

According to E. R. Oeschger, foundry department general manager, the stirring action will produce many beneficial results, including these: An almost complete removal of such impurities as phosphorus and silicates with very little or no loss of metal; reduction in sulphur to about one-third the best levels attainable with conventional practice; better control of grain size in austenitic steel because the furnace temperatures will be uniform; accurate prediction of final alloy adjustments. Chemical stratification is minimized, and sample analyses are representative of the entire heat; also, refining time is reduced.

One of the Schenectady Foundry electric arc furnces is a 13.5-foot-diameter, 50,000-pound-capacity unit. The other is an 11-foot-diameter, 25,-000-pound-capacity furnace. Both furnaces annually produce 13,500 tons of steel.

Eleven direct current motors and one motor-generator set are used in running the furnaces and stirrers. Two separate water systems are used for cooling each of the furnaces and associated equipment, one system being a stand-by for emergencies. Each system uses water at the rate of 16 gallons per minute.

The stirrer assembly including coils and container, on the 50,000-pound furnace weighs 17,000 pounds. On the 25,000-pound furnace the stirrer will weigh 13,000 pounds. The coils on each of the furnaces are protected from overheating by a warning system which is temperature actuated. The system includes temperature measuring devices consisting of thermistors installed at various positions on the furnace bottom; its function is to indicate the temperature of the water in the coil cooling system and of the furnace bottom.

These temperature measuring devices are set to trip an alarm system if a predetermined safe temperature is exceeded. When the alarm system for the furnace bottom is tripped, a horn will sound and the stirrer will automatically be stopped. If the coil or its coolant have become overheated, a bell will sound and the stirrer will also be stopped. Signal lights indicate the nature of the trouble and the exact hot spot will be found by manipulation of indicating temperature dials on the panel

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Light, tough, long-lasting — designed to reduce operator fatigue, minimize spillage and improve heat transfer. In 23 sizes, from ¼ lb. to 30 lbs.—with or without handles. A die-casting *must*.

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board which may be connected into any one of the thermistors.

Current is to be supplied to the stirrers on both furnaces by a special single-phase, 1.4-cycle commutator type generator rated at 250 kva at 0.2 PF, driven by a 280-hp, 60-cycle, 440-volt, 1770-rpm three-phase slip-ring, induction motor. Excitation is to be provided by a specially built Schrage phase and frequency converter with a rotating primary and regulation windings and stationary secondary winding.

The moving magnetic field generated by the current flowing in the stirrer coils may be caused to move in either of two opposite directions so that the metal flow in the furnaces may be directed up at the spout for pouring, or up at the slag door for slag-off operations.

Opens New Canadian Plant

Federated Metals of Canada Ltd. opened its new nonferrous metal fabrication, processing and refining plant in Toronto September 14 and is rushing completion of its new Montreal facility. Zinc die casting alloys are included among the metals the two plants will smelt and alloy.

Book Review

Transactions, American Foundrymen's Society, Vol. 64, 1956, cloth, published by the American Foundrymen's Society, Golf and Wolf Roads, Des Plaines, Ill. Price $10.

Containing nearly 100 papers and discussions presented at the annual meeting of the society in Atlantic City, N. J., this volume reflects authoritative and current technology of the foundry industry in its content. Subjects range from operating practice to research developments in metallurgy, melting techniques, applications of statistical quality control, equipment, incentives.

Book Review

Proceedings, 1955, American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa., 1264 pages. Price, $12.

The 1955 edition of the *Proceedings* of the ASTM contains 1264 pages which record the technical accomplishments of the society during the year. It includes many technical reports and papers, together with discussion offered to the society during the year and accepted for publication in the *Proceedings.* Material includes papers from the annual meeting, reports of technical committees, and indexes all symposiums published as special technical bulletins and all papers published in the bulletin of the society.

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Baroid

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Big foundries . . . big users depend on National Bentonite to bond better molds, minimize sand problems and rejects.

They know they can rely on National Bentonite for uniform high quality . . . hot strength to resist erosion, washing and cutting... fewer blows, pin holes or rejects . . . less gas and steam to vent . . . castings that peel clean, shakeout with fine finish.

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Industry Briefs

A million dollar expansion program has been completed at Swedish Crucible Steel Co., Detroit. A major part of the expansion was in the foundry division, where increased production will result from a new 1½-ton electric furnace, automatic sand handling equipment, an additional 1200-ton sand bin capacity and modern laboratories. Crane runways were rebuilt and a 15-ton crane was added to handle heavier castings. The expansion included new administrative offices of more than 12,000 sq ft.

Superior Brass Works Inc., Detroit, has acquired Kendrick Mfg. Co.'s assets there and will operate the company as Kendrick Division. After a few months, Kendrick operations will be moved to Superior Brass's plant when necessary alterations are completed. Kendrick equipment will be sold.

Canadian Steel Foundries Ltd., a new company, is taking over the facilities of the steel foundry division of Canadian Car & Foundry Co. Ltd., Montreal, and will operate them as a separate entity. Both companies are members of the A. V. Roe Canada Ltd. group.

A. P. Green Fire Brick Co., Mexico, Mo., has acquired, through a plan of reorganization, Pyrex Refractories Co., Oak Hill, O.; Durex Refractories Co., Jackson, O.; and Portsmouth Clay Refractories Co., South Webster, O. A. C. Sanger and W. K. Stevens will be in charge of operations and sales, respectively. All personnel of the companies will be retained, and the present organizations will continue.

Shenango-Penn Mold Co., Dover, O., has been consolidated into the parent organization, Shenango Furnace Co., Pittsburgh. As a result of the consolidation, the Dover, O., operation will be known as the company's Centrifugally Cast Products Division.

Symington-Gould Corp., Depew, N. Y., has acquired "a substantial interest" in Oregon Metallurgical Corp., Albany, Oreg. Oregon Metallurgical has begun research and production of ingots and castings of titanium, zirconium and other metals.

Frederic B. Stevens Inc., Detroit, has appointed the R. F. McGuire Co., 106 East Melvina St., Milwaukee 12, as exclusive Wisconsin distributor of its metal finishing equipment and supply products.

Sonken - Galamba Corp., Kansas City, Kans., will expand its Miami, Fla., branch operation. With additions to be completed by 1957, the Miami plant will include about 30,000 sq ft. New furnaces are planned for preheating or homogenizing billets, and either tilt-mold or direct chill-cast billets will be offered in sizes ranging from 5 to 20 in.

American Pattern Works Inc. has been formed in Waukesha, Wis., with an authorized capital stock of 101 shares of common of no par value. Incorporation papers were signed by Symphor J. Hethke, Walter E. Richards, Elmer B. Szeblewski and Daniel C. Mueller. Mr. Hethke, Route 6, Church Drive, Waukesha, is the registered agent.

Florence Stove Co. will close its Gardner, Mass., plant sometime between November and March, as soon as current contracts for manufacture of airplane component parts are completed. The company will continue to operate its stove plants in Lewisburg, Tenn., and Kankakee, Ill.

W. L. Jenkins Co., manufacturer of chills, has moved into its new plant at 1445 Whipple Rd., SW, Canton, O. The Jenkins company also owns Canton Chaplet & Mfg. Co., which will continue to make chaplets in its plant at 334 Third St. SE, Canton.

Republic Steel Corp., Cleveland, has appointed Plant Equipment Co., 1400 Market St., Denver 2, to handle sale and distribution of the material handling equipment made by the firm's Pressed Steel Division, Cleveland.

Lewis-Shepard Products Inc., Watertown, Mass., has appointed W. G. Smith, 2121 N.W. Thurman, Portland, Oreg., to be its exclusive sales and service representative in the Portland area. Mr. Smith has complete sales and service facilities available.

Industrial & Foundry Supply Co. has moved. Formerly located at 1434 Howard St., San Francisco, the firm now is at 2500 Union St., Oakland 7, Calif. The telephone number is Glencourt 2-1226.

Arcee Foundry Inc., 9220 South Atlantic Blvd., South Gate, Calif. plans to occupy a one-story, rigid-steel frame and metal storage building, 40 x 60 ft in area, which is being built on the property it now occupies.

NEW RESEARCH FACILITIES: Artist's rendering shows one of the entrances to the new Parma, O., research laboratories of National Carbon Co., a division of Union Carbide & Carbon Corp. The multimillion dollar laboratories were dedicated Sept. 18. They contain approximately 175,000 sq ft of floor space and will be used for basic research in chemical and solid state physics

FRICTION SAWING CUTS TRIMMING COSTS

Removes Gates and Risers from Castings Faster and Cleaner Than Any Other Method

Like a hot knife through butter, DoALL friction saw bands slice through gates, risers and flash in seconds . . . up to 50% faster than any other method. (The finish is clean, reducing subsequent grinding costs.)

DoALL friction saw bands run at speeds up to 15,000 fpm. Frictional heat softens the metal ahead of the cut. The saw blade hogs this softened metal at an amazing rate.

The DoALL Zephyr band machine and the DoALL friction saw band are specifically built for high-speed friction sawing of ferrous metals. See their amazing cutting action. Call your local DoALL Sales-Service Store for a free demonstration or write:

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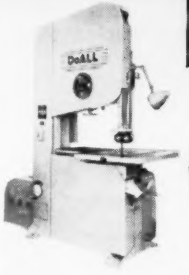
FREE CATALOGS — Ask for new Zephyr and friction saw band catalogs—they lead the way to lower cost production!



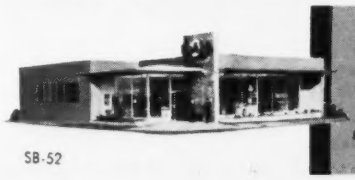
The DoALL Zephyr Band Machine

36" throat depth, 20" work height, automatic brakes, power feeds (optional) and infinitely variable speed range to 15,000 fpm. Variable speed lets you contour saw, file and polish as well as friction saw—see this heavy-duty machine in action. Ask to have a free demonstration at your plant.

The DoALL Friction Saw Band

Available in: 500' coils or welded lengths to fit *any* band machine: ½", ¾" or 1" widths; and 10 or 14 pitch. Special heat treating provides longest flex life and fastest cutting. Try one of these long lasting blades today!

Friction saw bands and other cutting tools stocked locally by friendly DoALL Sales-Service Stores in 38 cities—call yours today.



SB-52

"People's lives depend on our castings," says Nick Odorisio

"And we depend on Cities Service Core Oil," continues this well-known foundryman at Kimball Brothers Company.

If you operate a foundry, there's a chance you've heard of Nick Odorisio. Now with Kimball Brothers Company of Council Bluffs, Iowa, Nick has devoted the last 45 years to the foundry business, guiding many a mid-west foundry to smoother operation.

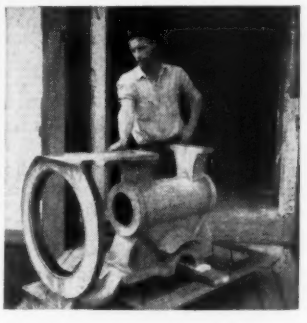
"Here at Kimball Brothers," says Nick, "there's probably less room for error than in almost any other foundry operation . . . for we make freight and passenger elevators ranging up to 30,000 pounds capacity, and people's lives literally hang on the quality of our castings.

"Naturally, that requires perfect cores and perfect core oil . . . and that's why we rely on Cities Service Delco #36. I've been in the foundry business since I was 15 years old and tested a lot of core oil, but Cities Service Delco #36 gives more trouble-free performance than any other oil I've ever seen. The oil is uniform, prevents trouble with gas which could produce flaws, and allows practically no breakage of cores. I'd never hesitate to recommend Delco #36."

For more information about this unique core oil which Mr. Odorisio praises so highly, talk with a Cities Service Lubrication Engineer. Or write: Cities Service Oil Company, 20 North Wacker Drive, Chicago 6, Illinois.

Getting to the Core of the Situation. Kimball Brothers makes cores for elevator castings ranging from a few ounces to 1500 pounds. But there's almost never any breakage or flaws, thanks to Cities Service Delco #36 Core Oil.

Complicated Casting Made Without Complications is displayed by Assistant Foreman Richard Flowers. Like Nick Odorisio, he combines expert knowledge with extreme pride of craftsmanship and Kimball Brothers' castings reflect it.



CITIES SERVICE

QUALITY PETROLEUM PRODUCTS

NATIONAL METAL SHOW AND CONGRESS MEET IN CLEVELAND

RECORD-BREAKING attendance is anticipated by the American Society for Metals at the National Metal Exposition and Congress, to be held in Cleveland, Oct. 8-12.

Capacity of Cleveland's Public Auditorium will be taxed by approximately 475 exhibitors who will occupy 300,000 square feet of display space in the 38th annual Metal Show. Some 155 technical papers will be presented during the week at the Metal Congress by the ASM and associated societies.

These latter groups participating in the technical program include the American Welding Society, American Institute of Mining and Metallurgical Engineers, Society for Nondestructive Testing and Industrial Heating Equipment Association.

Foundry Topics—A number of technical sessions will have subjects of interest to foundrymen. Among them are:

"Notch Ductility of Malleable Irons," by G. A. Sandoz, N. C. Howells, H. F. Bishop and W. S. Pellini, Naval Research Laboratory.

"New Nodular Iron Process," by Harry K. Ihrig, Allis-Chalmers Mfg. Co.

"The Deformation and Rupture of Gray Cast Iron," by W. R. Clough, Electro Metallurgical Co., and M. E. Shank, Massachusetts Institute of Technology.

The above three papers will be presented at an ASM session at 9:30 a.m., Oct. 8.

The Society for Nondestructive Testing will sponsor educational sessions on Oct. 8 which will include discussions of various testing methods. These practices include radiography, fluoroscopy, and magnetic particle, ultrasonic, penetrant and eddy current testing.

"A New Nodular Cast-Iron Welding Rod for Foundries and Fabricators," by R. O. Day, J. S. Snyder and H. V. Inskeep, Linde Air Products Co., will be presented at a morning session of the American Welding Society on Oct. 10.

The Industrial Heating Equipment Association will conduct a morning session Oct. 9 on the subject of furnace atmospheres, their selection, application and control. Speakers will include Curtis H. Vaughan, Electric Furnace Co., Clarence E. Peck, Westinghouse Electric Corp., Wayne Besselman, Leeds & Northrup Co., Walter Holcroft, Holcroft & Co., Orville Cullen, Surface Combustion Corp., and Norman H. Davies, North American Mfg. Co.

Awards—A number of awards will be made by the ASM during the congress. Edgar H. Dix Jr., assistant director of research, Aluminum Research Laboratories, Aluminum Co. of America, is the 1956 winner of the Albert Sauveur Achievement Award.

The Henry Marion Howe Medal Award will go jointly to Dr. A. R. Troiano, head, Department of Metallurgy, Case Institute of Technology, Dr. William J. Barnett, General Electric Co., Evendale, O., and Dr. Richard P. Frohmberg, North American Aviation Corp., Downey, Calif.

The ASM Research Medal will be presented to Charles M. White, board chairman, Republic Steel Corp. This award will be made at the annual banquet, Oct. 11, at which the main speaker will be Dr. John R. Dunning, dean, School of Engineering, Columbia University.

Annual Meeting—New officers for 1956-57 will be installed during the ASM annual meeting Oct. 10. Currently vice president, the new president will be Dr. Donald S. Clark, California Institute of Technology. G. M. Young, technical director, Aluminum Co. of Canada, becomes the new vice president. Dr. Clarence H. Lorig, Battelle Memorial Institute, Columbus, O., continues as treasurer and William H. Eisenman as secretary.

The Campbell Memorial Lecture will be delivered following the annual meeting by Dr. Charles S. Barrett, University of Chicago Institute for the Study of Metals. His subject will be "Metallurgy at Low Temperatures."

IMS Sponsors Study Clinic

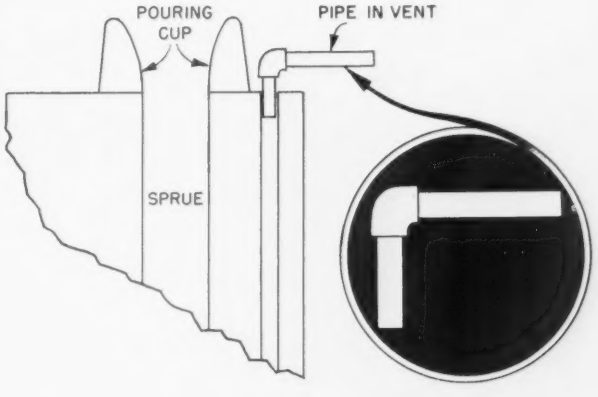
Industrial Management Society, 35 East Wacker Dr., Chicago 1, is sponsoring a Time and Motion Study and Management Clinic featuring a Work Simplification Film Festival. It will be held at Hotel Sherman, Chicago, on Oct. 31 and Nov. 1-2. Sessions are scheduled for the evening of the first day and will be conducted all day on Nov. 1-2.

HOW TO DO IT

Pipe Removes Mold Gas and Prevents Spilled Metal From Entering Vent

By BYRON E. KENNEL
Assistant Editor
STEEL

VENTS must be incorporated in dry sand molds to allow gas to escape. In the mold shown here the only possible place to bring the gases off easily was located near an open riser. When the riser was topped off, spilled metal occasionally would block the vent. To prevent this, one leg of an L-shaped pipe assembly was inserted in the top of the vent with the other leg pointed away from the riser. Free escape of mold gas thereby was insured. Molding sand placed over the pipe on top of the mold protected it for reuse.



Do you have any tricks of the trade tucked away with your foundry experience? Why not release them to fellow foundrymen? FOUNDRY will pay a minimum of $15 for each idea submitted and published. Send a photo or drawing with your idea.

ROTA-LIFT®

TAKES THE MUSCLE OUT OF MOLDING

Osborn Rota-Lift® mechanizes large match plate mold making

Muscle—the weight a man can lift—is no longer a limiting factor in large match plate molding. Osborn Rota-Lift Molding Machines enable your operators to handle these large molds with a minimum of effort. This means more castings per mold . . . less cost per casting.

A typical Rota-Lift operation is making large match plate molds for the casting shown opposite. Here one man, one Rota-Lift—using a 23″ x 23″ flask with 4″ drag and 10″ cope—turns out 125 molds per day.

Different sized Rota-Lift models fit a wide range of foundry molding jobs. Your Osborn foundry specialist will gladly recommend the Rota-Lift to improve and increase your mold production. Write *The Osborn Manufacturing Company, 5401 Hamilton Avenue, Cleveland 14, Ohio.*

OSBORN®

Leader in mechanization for the foundry

MOLDING MACHINES
CORE BLOWERS
INDUSTRIAL BRUSHES

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FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

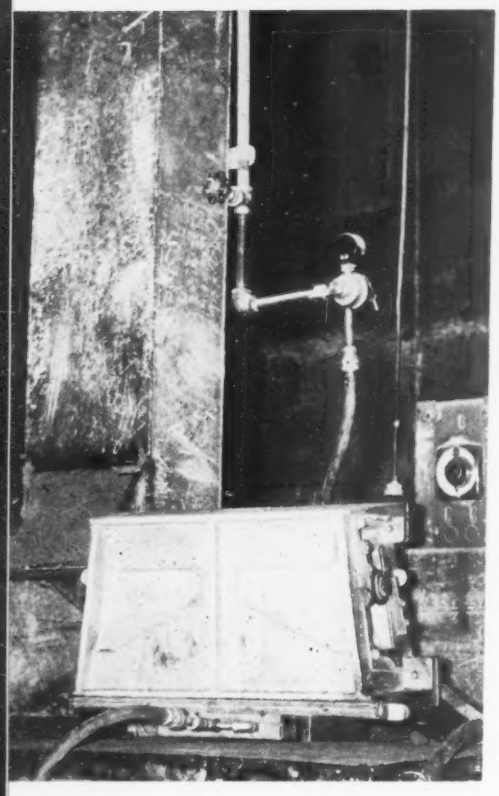


Fig. 1—Gassing unit on coremaker's bench. Note sand supply chute at left above bench level

Fig. 2—Coremaker at work with cores for automotive air conditioning units in foreground

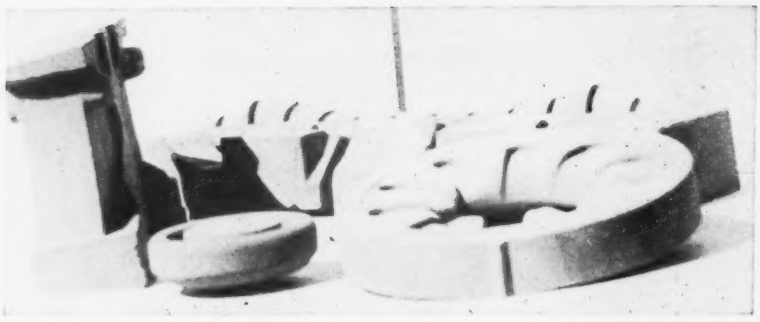


Fig. 3—Intricate cores ranging in size from a few ounces to 78 lb are made regularly on a production basis at Lehigh Inc.

CO_2 Cores . . . Reduce Production Costs

By HANS JACOB
Foundry Superintendent
Lehigh Inc.
Easton, Pa.

BEING a progressive foundry and always willing to experiment with anything new to determine its ultimate value to our overall operation, Lehigh Inc. was highly interested in the early announcements in the technical journals concerning the CO_2 core and mold making technique.

Since then this process has created considerable discussion in the industry. Some foundrymen talk about terrific hot strength and shakeout difficulties. Some are complaining about cores not too well suited to their production because the cores are not strong enough in the handling stage. Others complain about cost. In reality, all of it is relative.

We started to use the CO_2 process in making a core for automotive air conditioning units (Fig. 2) to be poured in gray iron.

After considerable experimentation, with a constant effort being made to reduce the amount of sodium silicate binder, we learned we could obtain collapsible cores suitable for malleable castings. Changing our mixes back and forth by adding and leaving out wood flour and iron oxide, and adjusting our mulling time from four minutes to two, we are now producing 75 per cent of our cores with CO_2. Our core costs are reduced and, most important of all, our production men like it better than other sand mixtures.

Our standard mix consists of 300 lb of New Jersey silica sand, 75-85 AFS fineness, 15 lb of Steinex (a proprietary sodium silicate binder) and 3 lb of seacoal. Sand and seacoal are mulled for one minute. The binder is added and the mixture is mulled for two minutes. Moisture content of the silica sand is below ½ of 1 per cent.

We also mix our own binding material by purchasing a No. 16 sodium silicate and a crude invert sugar solution, which is a syrup treated with acid to prevent hardening. This solution is mixed as follows: To 300 lb of New Jersey silica sand, 75-85 AFS fineness, add 3 lb seacoal and mix for one minute; add 3 lb syrup and mull for two minutes; add 12 lb sodium silicate and mull for two minutes.

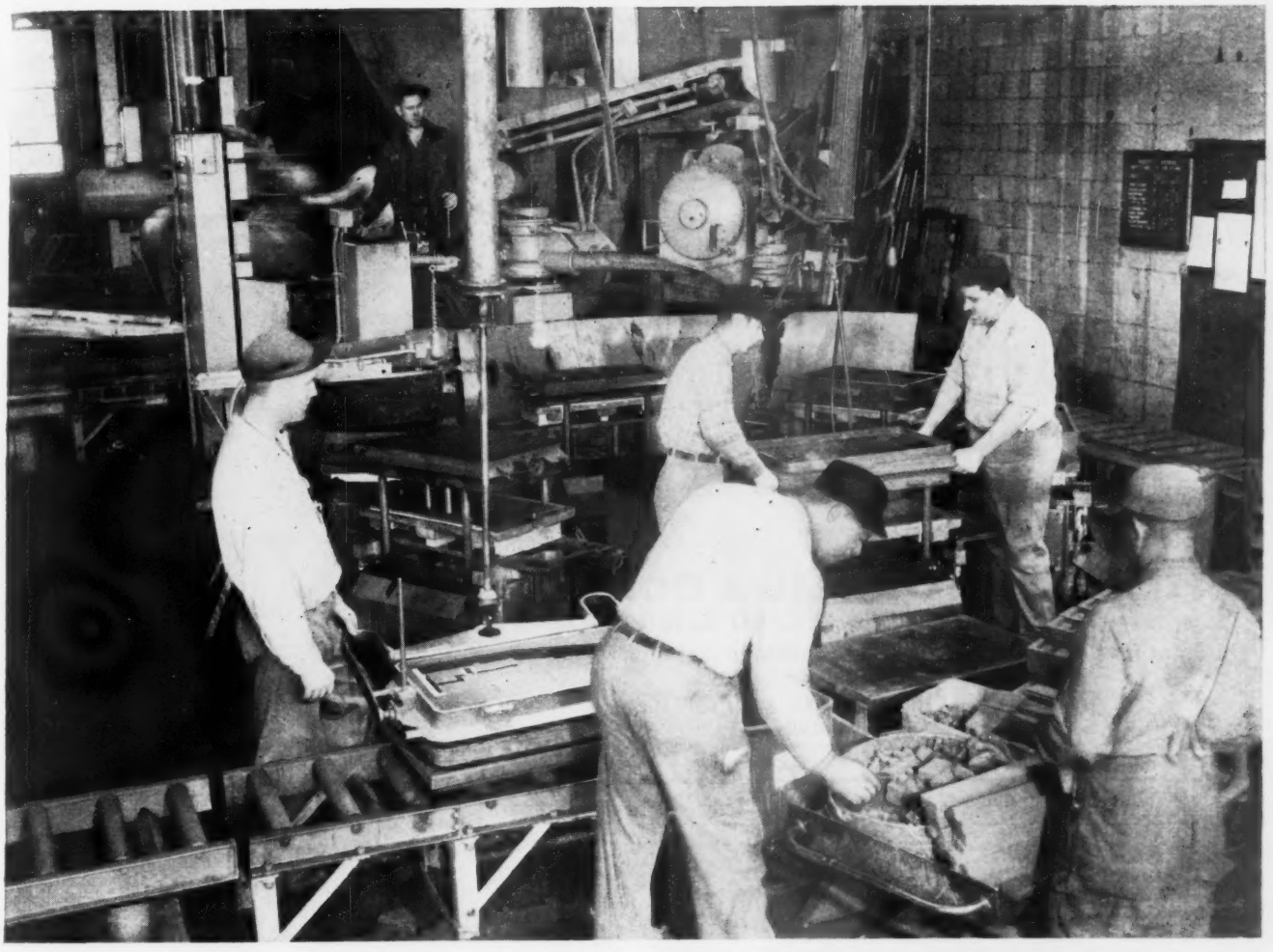
Our sand is mulled on the second floor and dropped through an enclosed chute to a level 8 in. above the coremaker's bench (Fig. 1). Because CO_2 is heavier than air, the gassing mechanism is kept lower than the sand to keep the mixed sand in workable condition for a maximum period. Mixed sand has been on the coremaker's bench up to 2 hours without detrimental effect.

Too long a mulling cycle has given us a poorer packing core sand and a softer setup. Overgassing also has produced a softer core which, after molding, has poorer collapsibility. Our gassing time is reduced to a minimum depending upon the size of the core.

Sodium silicate produces gas but less than the usual amount produced by core oil or resin. We have no difficulties with blow holes and have reduced core venting more than 50 per cent.

We started out buying CO_2 in steel bottles but changed to a low-pressure storage tank, installed free by the supplier, which reduced the pound

There's a slinger unit designed for every job

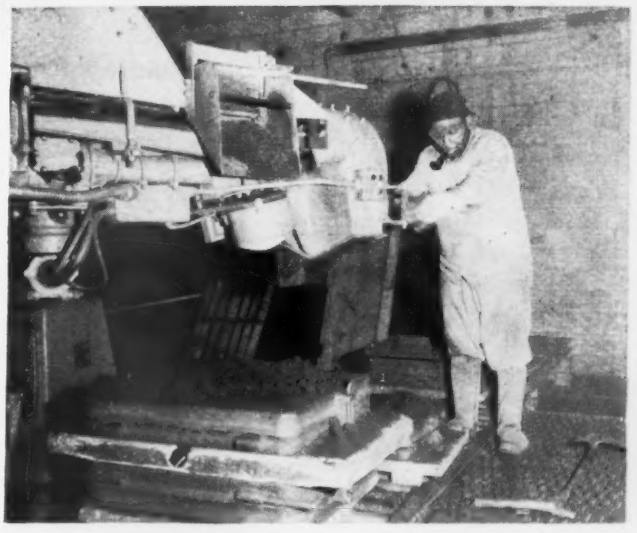


A CASE STUDY at the Detroit Stoker Company, Monroe, Michigan where this Hydra-Slinger Roto-Mold Unit handles many of the foundry's medium size production and semi-production patterns on an efficient production cycle.

Two efficient molding units—each built around a slinger — have recently been installed at the Detroit Stoker Company, Monroe, Michigan. One unit, with Hydra-Slinger, B & P Roto-Mold turntable and six B & P Speed-Draw Machines, handles the foundry's production and semi-production work. The other unit with Sandslinger and B & P Rol-A-Draw rollover draw machine handles the jobbing work.

Both units are ideally adapted to the range of work handled, and both have contributed greatly to the overall success of this foundry. This plant offers an excellent example of how slinger mechanization can meet greatly varying requirements.

There are slinger units designed for every job—from loose pattern jobbing work to highest production repetitive production work. Bulletin 320 has all of the facts . . . send for your copy today. Beardsley & Piper, 2424 N. Cicero Ave., Chicago 39, Illinois.



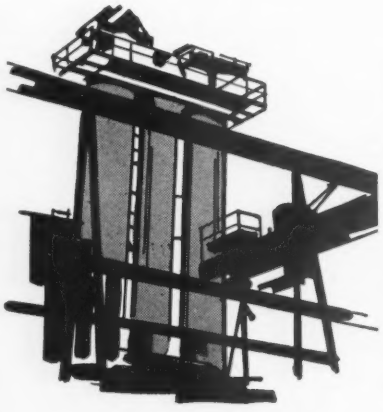
LARGER JOBBING WORK at Detroit Stoker is rammed by this Stationary Sandslinger served by roller conveyor. These molds are rolled over and drawn on a B & P 920 RCX Rol-A-Draw rollover draw machine.

THE WORLD'S LARGEST EXCLUSIVE MANUFACTURER OF FOUNDRY MACHINERY

The big selling point for

TERRE HAUTE SPECIAL FOUNDRY COKE

is the way foundries buy it . . .



• They buy it for top ratings in chemical and physical qualities—for clean sizing—for uniformity that occurs alone from exceeding care.

Only premium grades of West Virginia coking coals go into it—the best the market affords.

RESULT? You choose wisely and permanently when you specify Terre Haute Special Foundry Coke.

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Terre Haute, Indiana

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CHILL KOOLHEAD NAILS

Chill Nails and Spiders

You can rely on "KOOLHEAD" and "STANHO" products

for...
ACCURATELY CONTROLLED FOUNDRY CHILLING

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price of gas from 8 cents per pound to 4½ cents. The low-pressure tank is a 6000-lb unit and contains a 300-lb regulator valve. Using low pressures has eliminated freezing of regulator valves in our operation.

For gassing, we have used the bell and needle method. Our average is 50 lb pressure at the bench and we gas for about 15 seconds, again depending upon the size of the core.

Fig. 4—Silica-zircon sand, CO_2 ladle lining after 360 pours shows a minimum slag build-up

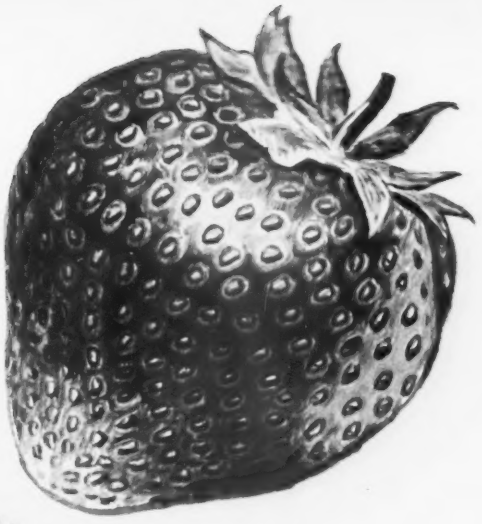
Most cores are used the same day they are gassed. We have held cores for three weeks and longer and used them without harmful effects.

To check for sodium carbonate build-up in our molding sand, our laboratory weighs a sample and dilutes it with water, heats it to the boiling point to free carbon dioxide, cools to room temperature, adds methyl orange indicator, titrates with hydrochloric acid until solution turns red and calculates the build-up.

Eliminating the need for corewashing has not produced difficulties with burnt-in sand, neither has it produced soda ash to weaken our molding sand to produce burnt-in surfaces. We have experienced no harmful effects in our molding sand, and a recent test indicated that less than 0.25 per cent of soda ash was in our sand.

Elimination of hot tears and cracks has sold this system of coremaking to us. We have used it for 18 months and daily are converting new jobs to it.

As an added bonus to our experiments with this process we are getting phenomenal service from our pouring ladles through use of a lining of sand and silicate binder that is gassed with CO_2. The mix consists of half silica-half zircon sand to



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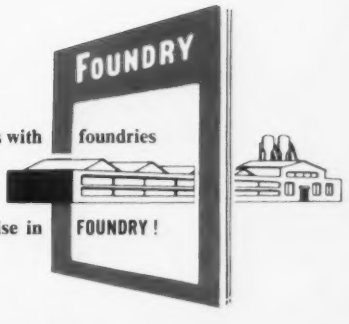

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FOUNDRY

which 6 per cent Steinex C has been added. This is mixed for four minutes and rammed into the ladle with an air hammer to a thickness of 1 in. Lining is gassed through four holes in its circumference for 25 seconds with CO_2 under 100-psi pressure.

Our melting foreman has been so pleased with this procedure that we are now lining all our ladles with this method. The ladle in Fig. 4 has been in use for three days or nine shifts, each shift has poured eight heats and in each heat it has been used five times, or a total of 360 pours without a slag build-up. Material cost for lining a 400-lb ladle is $1.87.

Editor's Note: This article is abstracted from a paper presented at the Technical and Operating Conference of the Malleable Founders' Society, held in Cleveland May 24-25.

AMA Adds to Marketing Series

Three new American Management Association publications summarize material which grew out of an AMA marketing conference held last February. "Building and Marketing a Profitable Product Line" surveys planning, pricing and distribution. "Strengthening the Sales Organization" describes ways to train salesmen which are based on the current marketing situation. "Broadening Horizons in Marketing" reviews the changing profile of the U. S. market, describes expanding sales opportunities in foreign markets and discusses the many challenges for sales management.

Nos. 98, 97 and 96, respectively, in the AMA's Marketing Series, these publications are priced uniformly at $1.75 to nonmembers and $1 to members. All are available from the AMA, 1515 Broadway, Times Square, New York 36.

ASM Presents Annual Award

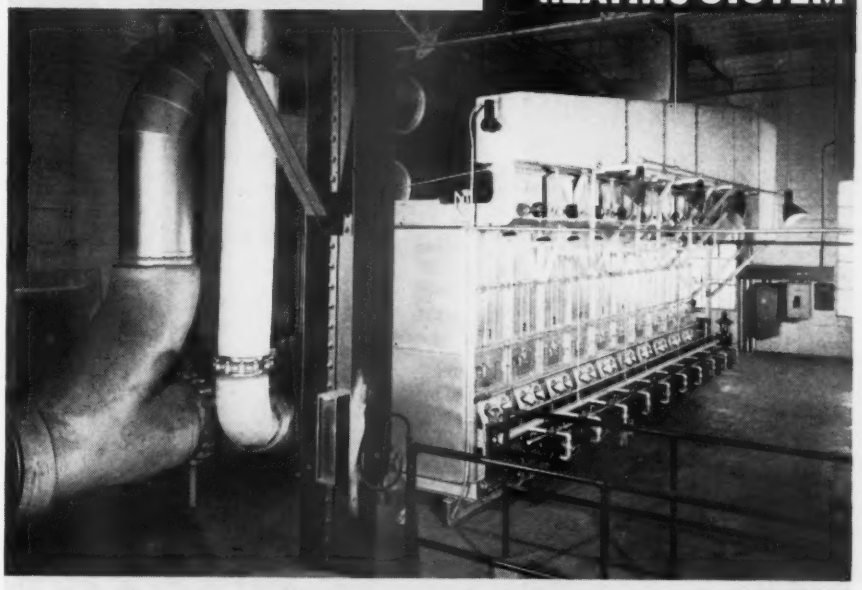
Ernest F. Nippes, professor of metallurgy, Rensselaer Polytechnic Institute, Troy, N. Y., is the winner of the 1956 $2000 teaching award sponsored by the American Society for Metals. He was selected the winner by a special awards committee named by the ASM board of trustees.

Professor Nippes has been a member of the Rensselaer metallurgical engineering faculty since 1938, first as an instructor, later as assistant professor and since 1954 as a full professor. In addition to his teaching schedule he has served several major industrial firms on a consulting basis. He has had many technical articles published and is a member of eight technical societies and a past chairman of the Eastern New York Chapter of the ASM.

Cuts Cupola Operating Costs

while increasing tonnage

ROSS HOT BLAST HEATING SYSTEM



Overall view of ROSS Hot Blast System from discharge end showing hot air header and cold air bypass joining pipe to cupola.

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AVOID BRIDGING

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MORE CARBON PICK-UP

QUICK START-UP

most widely used method for cupola heating

The savings and operating advantages listed at left result from the higher entering blast air temperature obtained through use of a ROSS Hot Blast System. This modern method of pre-heating the air to the cupolas is fast becoming standard equipment throughout the industry.

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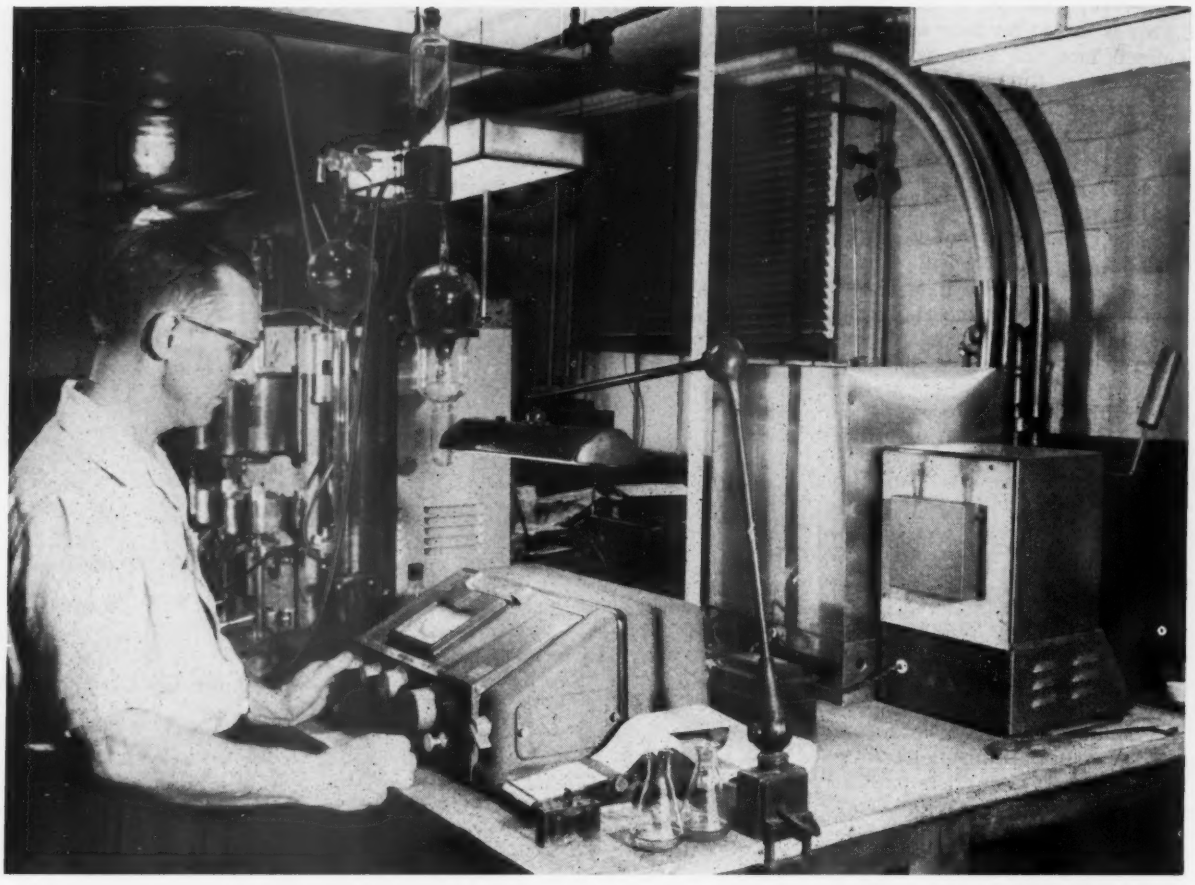


With spectrophotometer, silicon content of gray iron is determined in 16-20 minutes

Spectrophotometer Saves Time in

ANALYSIS OF GRAY IRON

USING a method employed successfully at various steel mills, Golden Foundry Co., Columbus, Ind., is saving 45 minutes compared with previous practice in determining the silicon content of gray iron samples. Use of a spectrophotometer has speeded the process.

Present practice calls for the taking of samples at approximately 15-minute intervals on the melting floor, cooling with air and water successively, taking drillings from the sample and transmitting the drillings in an envelope to the chemical laboratory by pneumatic tube. The method of silicon determination used previously required elapsed time of 60 to 70 minutes before the results could be telephoned to the melting floor.

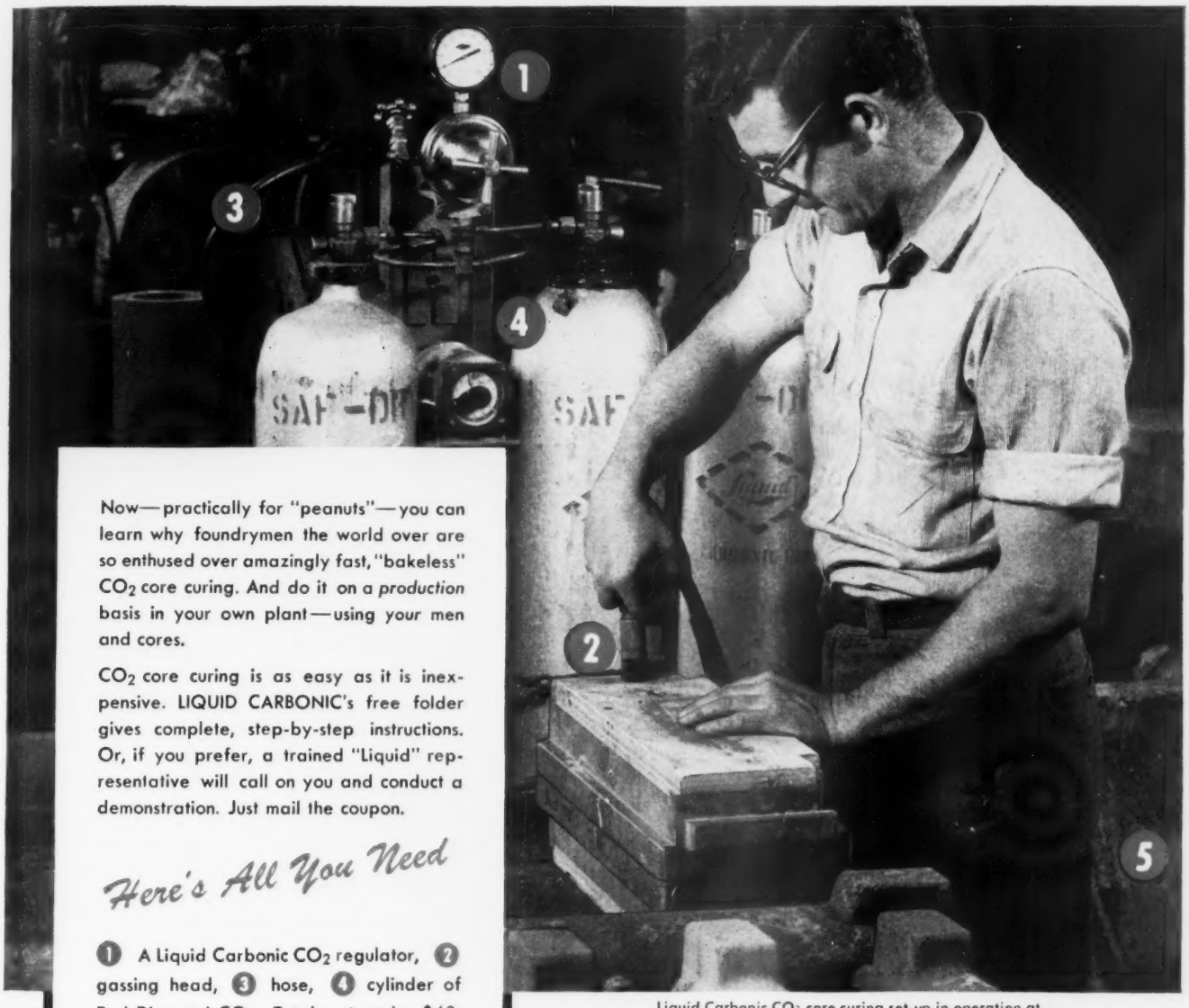
After reading about steel mill use of the spectrophotometer, and on the recommendation of the Chicago Apparatus Co., the unit was installed and the time for silicon determination was reduced to 16 to 20 minutes elapsed time, of which about 10-minutes' attention is required on the part of a chemist. Results are transmitted by pneumatic tube.

The company also uses the unit routinely in the determination of copper, vanadium, molybdenum and combined carbon in gray iron. Considerably fewer analyses are run for these elements; it was found, however, that better analytical coverage could be had than was obtained previously, with no increase in laboratory personnel. The two-hours' elapsed time required for the conventional electrolytic copper determination was reduced by means of the spectrophotometer to about one hour, of which only about ten minutes of a chemist's time is required.

Time required for molybdenum determinations was reduced from a great many hours to less than one hour elapsed, again requiring only about ten-minutes' actual attention. Time requirements for vanadium showed no particular improvement, but the accuracy of results was thought to have been improved substantially, considering the particular range in which this element is normally present. Combined carbon analyses, on the other hand, do not have the order of accuracy ordinarily obtained by difference; they are sufficiently accurate, however, to be a useful guide and require only about 30 minutes of elapsed time, again with about 10 minutes of actual attention by a chemist.

The spectrophotometer method used is an adaptation of one described in *Analytical Chemistry*, May, 1949, by Uno T. Hill, Inland Steel Co. This unit was installed about four years ago and is thought to have been one of the earlier installations in gray iron foundries.

a production CO_2 core curing set-up for less than $50.00



Liquid Carbonic CO_2 core curing set-up in operation at Pacific Brass Foundry, San Francisco, California.

Now—practically for "peanuts"—you can learn why foundrymen the world over are so enthused over amazingly fast, "bakeless" CO_2 core curing. And do it on a *production* basis in your own plant—using *your* men and cores.

CO_2 core curing is as easy as it is inexpensive. LIQUID CARBONIC's free folder gives complete, step-by-step instructions. Or, if you prefer, a trained "Liquid" representative will call on you and conduct a demonstration. Just mail the coupon.

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Man to Man

RALPH L. LEE

"Maybe it would be a good thing if we started a movement away from specialization, toward a new breed of natural-born foundry fixers"

The Foundry Fixer

HARDLY a week goes by that the Lee Hobby Foundry does not have foundrymen visitors, singly and in groups, from all over creation. We had twenty-some all at once from England not long ago, and some from Sweden, Switzerland and Australia. Although production usually comes to a standstill while the president, patternmaker, melter, molder, cleaner and handyman stops what he's doing, I (in the role of president) wouldn't have it otherwise.

I get a mighty fine feeling down inside when I see others appreciating the results of my thoughts and work over many years. And I feel quite sure that our visitors, too, have a good time seeing a small sample of just about every foundry function, process, tool and material necessary to the making of patterns and castings all within arm's reach, so to speak.

Any number of them almost drool with the thought that one of these days, so help 'em, they're going to have a hobby foundry of their own. Then, too, the results of the research work we've done on flasks, diaphragm molding, and sand testing equipment come in for some "Ohs" and "Ahs." But I honestly believe that the comments which please me the most are those which have to do with the wide variety of odds and ends, ordinarily found in scrap piles, which have been rehabilitated into usable foundry equipment.

From Garbage to Metal—For instance, the nonferrous melting furnace (No. 10 crucible) started out in life as a garbage pail. The lid also is lined, of course, with refractory and insulation. Three channel irons serve as legs. The lid can be raised and swings horizontally on a mast, just as those on big furnaces do.

The blower, a homemade affair (castings and all), is driven by a motor which formerly served the family on an ancient vacuum cleaner. It nearly got away from me through a trade-in deal on a new cleaner! Two 100-watt electric lamps serve as a rheostat to control the blower when I screw one or both into their sockets. (They are connected in series, parallel with the motor.)

The air compressor unit really is a work of art—sort of a chop suey. I picked up the compressor body and innards for a song from the scrap pile of our village blacksmith. The tank, after serving some family for many years as a kitchen water heater, came to me through a plumber friend of mine.

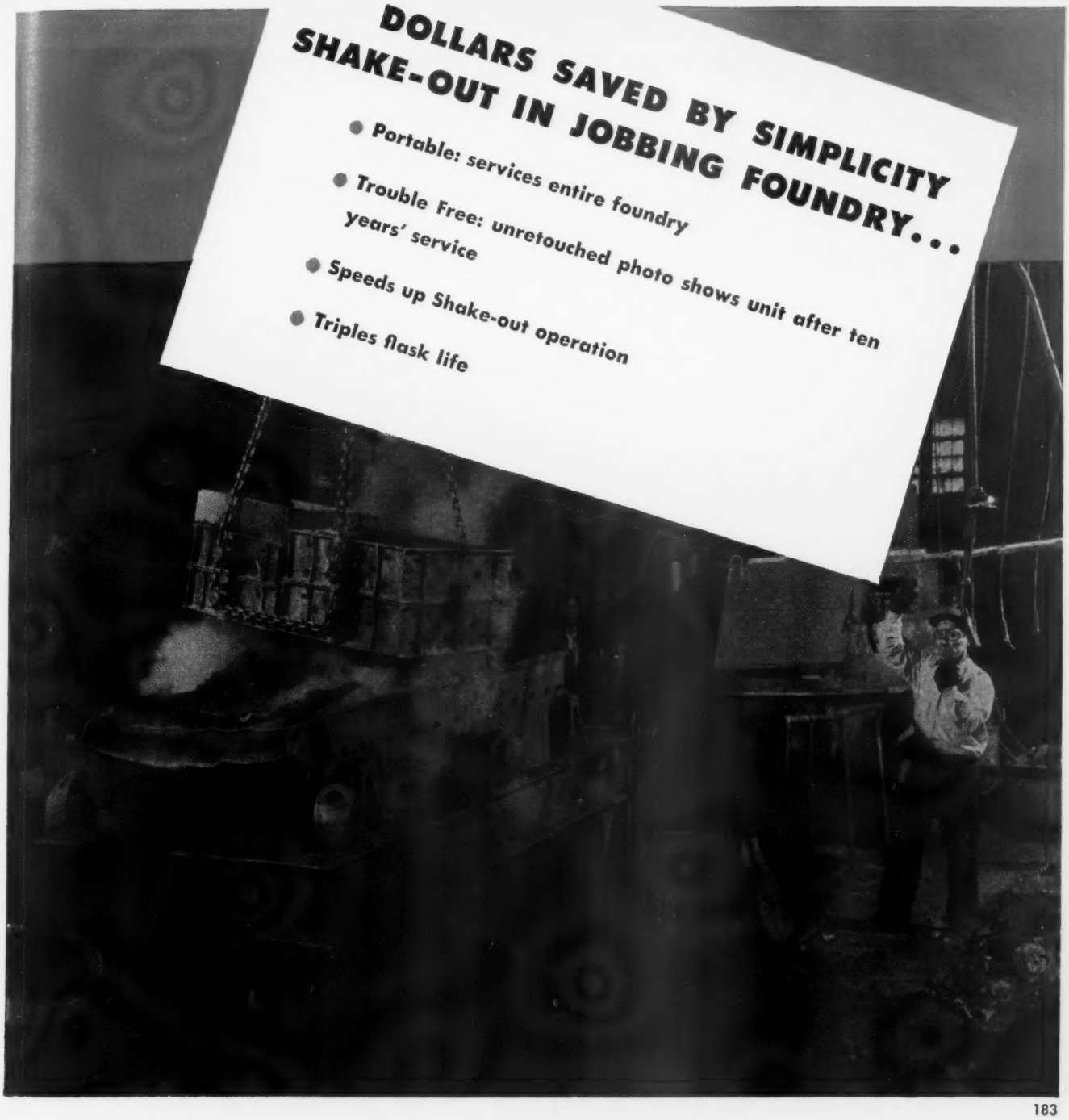
The automatic pressure control switch never dreamed it would end its days on a compressor, for it started out in life as a part of an electric water pump. The compressor fly wheel! I doubt whether there's another like it. It looks for all the world like one of those wooden wheels used on oxcarts down in the tropics for hauling sugar cane. It runs true, though, and just goes to show what you can do in a pinch with imagination, a saw and some leftover lumber. A little skill comes in handy too.

The foundry hobbyist rehabilitates odds and ends usually found on scrap piles into usable foundry equipment

The very much used 1-hp motor, which came through a fire, joined the family as a bargain, practically a steal, although the man was happy to get rid of it and we're still very good friends. When I first hooked it up I thought it was a 1750 rpm model. It wasn't, though. It turned out to be 3400 rpm, necessitating additional millwrighting—100 per cent more, in fact. It's amazing how all these odds and ends have got along together, pumping air for seven years now without a squabble.

The Old Soup Kettle — The little laboratory muller is our pride and joy. The worm gear reduction came to the Lee household as a part of the washing machine and also came within an ace of getting away through a trade-in on a new machine. Through homemade, spring-loaded muller wheels, this Goldberg contraption does a swell job on sand specimens in the former family soup kettle. With only Mother (Mrs. Lee, chairman of the board) and me at home now, such a big one isn't necessary any more. Besides, most of our soup seems to come in cans these days.

The core oven also is a do-it-yourself item. As a result of building it I practically genuflect in the presence of a journeyman tinsmith. There sure are tricks to all trades. Oh, yes! I just added a thermostatic control whose manufacturers thought they were building it for a kitchen gas stove. Boy! what a comfort this improvement is. Be-


DOLLARS SAVED BY SIMPLICITY SHAKE-OUT IN JOBBING FOUNDRY...
Portable: services entire foundry
Trouble Free: unretouched photo shows unit after ten years' service
Speeds up Shake-out operation
Triples flask life

183

"It is an extremely rugged machine, and except for small replacement of parts, needs little maintenance . . . we are very pleased with its service." This praise for a Simplicity 4' x 8' Portable Gyrating Shake-out comes from the General Manager of Saginaw Foundries Company, Mr. Lenwell Cline. The Simplicity Shake-out has been in operation at this Saginaw, Michigan, job foundry for 10 years, handling all shake-out work for the plant's small casting area. Very hot steel castings, ranging from 5 to 400 pounds, are shaken-out. The Shake-out is moved by crane from one pouring bay to another, and when plugged in is ready to operate. Faster shake-out, cleaner castings and triple flask life over previous manual shake-out are reported by Mr. Cline. Your plant, too, may benefit from installation of Simplicity equipment . . . why not write today for our Foundry Equipment Catalog?

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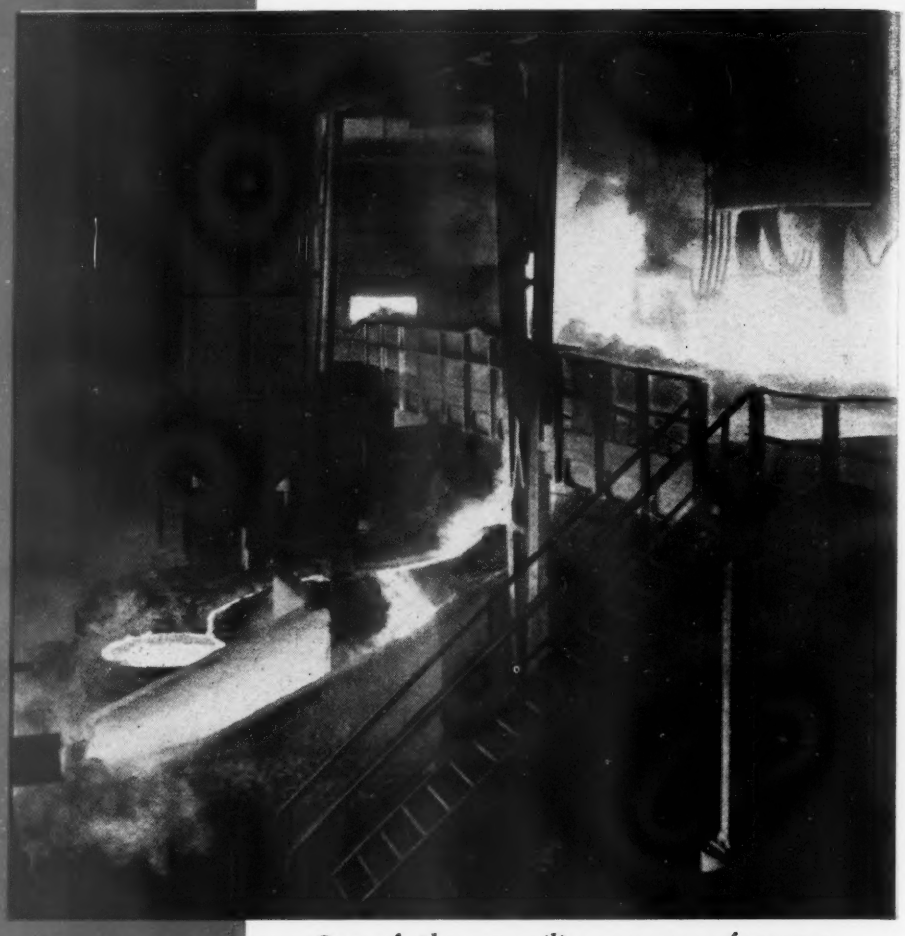

One of the new silicomanganese furnaces at our Philo, Ohio plant.

Ohio Ferro-Alloys has been a continuous producer of silicomanganese since 1952. To assure an ample supply for the future needs of the iron and steel industry, new facilities which double previous capacity are now in operation at our Philo, Ohio plant.

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fore, I had to fiddle around turning the gas up and down, waiting around. Now I set the old dial and, bingo, right on the nose! One of these little one-hour kitchen alarm clocks rings the bell when the cores are done. It's practically automation.

Other conversions in the Lee Hobby Foundry catch the eye and win approving comments from our visitors but I think we've covered enough to illustrate what can be done on a peewee budget, in fields other than your own, with a little courage, will to do, imagination, patience and a few tools.

The interest and almost surprise shown by many of our foundrymen visitors in the results of our do-it-yourself enterprise reminded me that many of the foundrymen I have visited seem to be pretty much all thumbs when it comes to working with materials other than sand, particularly in the smaller foundries. With no thought of criticism, I've seen some pretty rugged examples of metal work for instance, where emergencies had forced foundrymen into foreign trades. In millwrighting and pipefitting, I've seen quite a few dillies.

What I'm wondering is this: Maybe it would be a darned good thing if we started a movement in the opposite direction of clean-cut specialization, toward a new breed of foundry fixers with a natural-born instinct for making just about anything out of almost anything and for fixing just about anything. I'll just bet that there are more of these folks about than we realize—or at least the makings of them.

The recent wave of do-it-yourself spreading all over the country seems to prove that a lot of people can do just about anything they set their minds to.

What It Takes—Succumbing to my own evangelism, I see one of these general practitioner craftsmen in each foundry (he's got to be a character of course), in his own little bailiwick, equipped with a good bench, a good vise (darned important), plenty of carefully selected hand tools, a good drill press, and maybe a lathe. He should have one of those little portable forges with anvil, tongs and stuff, a simple set of plumbing tools, a few sheet metal working things and a scad of bolts, screws, rivets, wire, pipe, sheets, rods and other inexpensive items. I see everything in order, too, including the general practitioner.

By the way, I have just described plant No. 2 of the Lee Hobby Foundry, which rarely is mentioned in this column. Mother and I live upstairs over it: It's in the basement.

Yes! I think we should start a movement. Our Foundry Educational Foundation is well on its way toward the education of engineers for the foundry industry, and I understand that great interest is being shown in the development and attraction of technicians into the industry—folks without college degrees, but with sufficient education and background to carry on engineering programs and routine already established. Now here I come along with the all-round craftsman, the general practitioner for foundry fixing and fixing up, the jack-of-all-trades with enough knowhow in all for the purpose.

One thing more about our visitors: The head of a large engineering and research organization, about to leave after a visit to the LHF, said, "Doc, would you mind if I sent several members of my staff out here for a look-see?"

"No," I replied. "I'd be happy to have them. I suppose you want them to see the ends to which a foundry fanatic can go?" "No," he replied, "that isn't it. I want these cookies, who can't think of a project that doesn't run into big money, to see what can be done on a shoestring with a little imagination, ingenuity and resourcefulness."

"And pride, too," I added.

"Yes, and pride," he agreed.

Day Co. Completes 75th Year Of Continuous Operation

Day Co., with main offices in Minneapolis, completes 75 years of continuous operation this year. Designers, manufacturers and installers of dust control systems in every phase of industry, the company has grown from the original plant in Minneapolis to include another installation there, branch plants in Buffalo and in Fort Worth, Tex., and Day Co. of Canada Ltd., with headquarters in Fort William and a branch plant in Toronto, Ont.

In addition to dust control systems and products, Day Co. has diversified in recent years into the bulk material handling field. Vertical bins, conveyor systems, elevator legs and spouting are among the additions that have increased the Day line of products.

A. B. Osgood is president and R. E. Gorgen vice president of the company.

"I remember his sayin' that he was gonna' substitute somethin' for high priced coffee—but I can't figure out what he's substituting?"

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An Important Message to Foundry Executives

Competition and the Seven

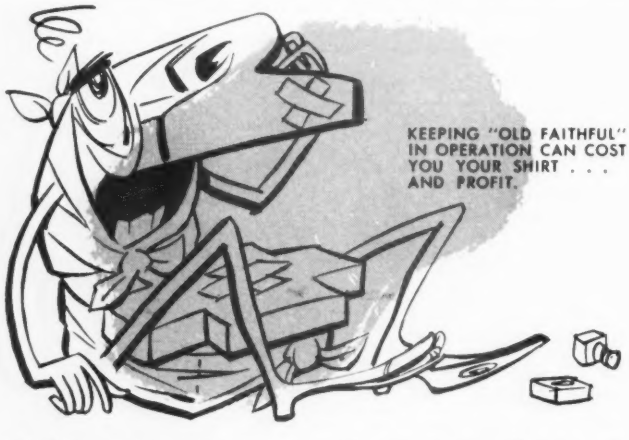
The *Law of Diminishing Returns* is becoming a curse in foundries of all types. Chief cause is the greatly accelerated rate of obsolescence in molding machines . . . and *time* is the key factor.

Seven years is a *relative* increment of time. Its significance varies with the subject concerned. A child of seven is only a youngster, still fourteen years short of maturity. A dog is pushing the averages at seven. And a foundry molding machine that is seven years old or older . . . no matter how well it has been maintained . . . is *economically* obsolete.

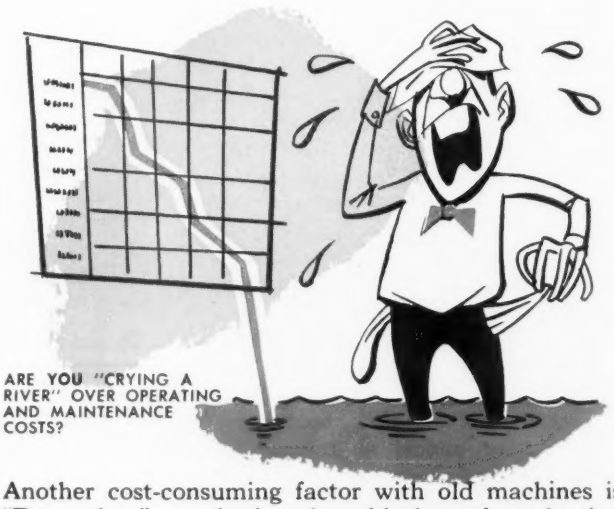
Other types of machinery still are in their prime at age seven. Why is the molding machine an exception? The answer is simple. Its environment as well as its function are unfavorable to longevity.

The abrasive action of sand is an accepted evil in molding operations. Every foundry has experienced profit-cutting "replacement costs", even with the best equipment. What many foundry executives overlook, however, is the fact that *replacement parts do not make a new machine.* They can bring a machine back to its *own* standard, but they cannot compensate for new production techniques or for basic improvements in molding machine design.

Admittedly, it is cheaper . . . in the short run . . . to replace parts than to purchase new machines. But what are the long-range aspects of this practice? If



rebuilt equipment cannot match a competitor's new equipment in capacity or economy of operation, how can a foundry using old machines meet competitive price and delivery schedules and still show a reasonable profit? This is not a rhetorical question. It keeps many foundry executives awake nights.



Another cost-consuming factor with old machines is "Down-time" . . . the irreplaceable loss of production capacity. The older a machine is, the more maintenance it requires, the greater the periodic down-time. *Unfortunately, "overhead costs" never stop for replacement.*

Consider your foundry's situation for a moment. Can you meet or beat your major competitors' price, quality and delivery? If you can, you are most fortunate. But . . . let's suppose you *are* at a competitive disadvantage. How long can you stay in that position and survive?

In industry, as in war, there are "the quick" and "the dead". The former keep pace with industry trends and changes . . . know when and how to improve operations and maintain their favorable position. These aggressive men also follow the policy of continual investment in new equipment.

The "dead" try to stand still in a moving current. They practice short-range economies and philosophies. And eventually they drown in the steadily rising river of competition.

The foundry economy is in a dramatic state of flux. A major factor is the growth of *automation* . . . a science with exciting, almost magical, overtones but with an extremely practical foundation. Automation is the large company's answer to shrinking profits as well as to greater production capacity of uniform standard. It is not, however, economically feasible for the majority

(Advertisement)

Concerning . . .

Year Curse

of jobbing or production foundries. In most cases, automated operations involve a far-greater-than-average capital expenditure.

This message is directed therefore to foundrymen who want to achieve greater efficiency and profits at relatively low cost. The answer here also is simple. *Invest in new high-speed semi-automatic equipment.* Relegate your seven year old molding machines to odd jobs. Or put them on the used machinery market. (There still are many who cannot see the "wolf at the door".)

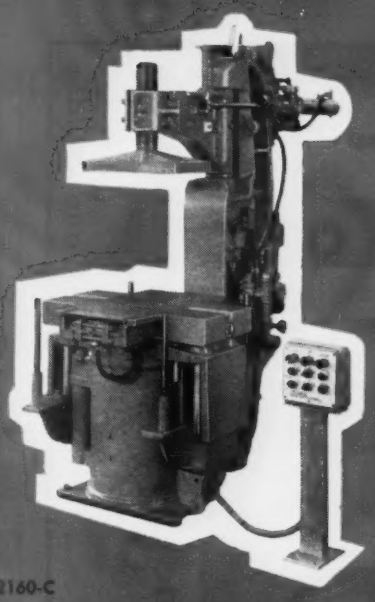
Once you have made this decision, select your new molding equipment carefully. But remember that old buying habits, like old machines, can cost you more in the long run.

EFFICIENT NEW EQUIPMENT GIVES YOU A COMPETITIVE ADVANTAGE IN PRICE, QUALITY, DELIVERY.

Your best bet is to select equipment made by the manufacturer who leads the industry in Creative Engineering . . . SPO Incorporated. Technological innovations developed by this company since World War II have had a profound effect on the foundry industry.

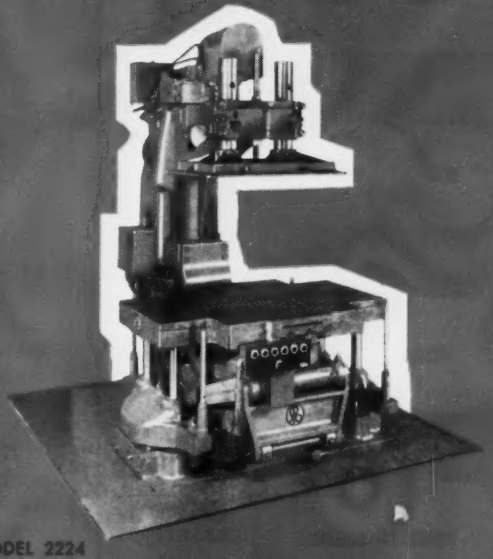
SPO "firsts" include development of the maintenance-free inverted jolt mechanism . . . the fully automatic SPOMATIC molding system and its components . . . the first practical hollow core machine . . . the self-aligning stripping mechanism . . . and the first successful application of green sand cores.

These accomplishments have established SPO as the leader in molding machine and ancillary equipment development. That is why SPO has become the world's largest supplier of molding machines, offering a complete range of types and sizes. SPO INCORPORATED, 6449 Grand Division Avenue, Cleveland 25, Ohio



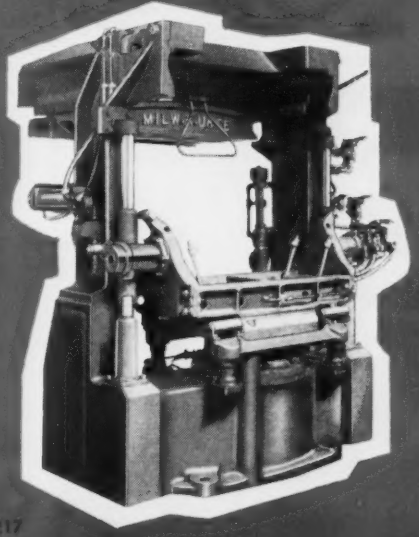
MODEL 2160-C

Series 2000-C *jolt-squeeze-strip/draw* machines feature automatic controls and simplified pushbutton operation. Available with squeeze cylinder diameters of 13, 14 and 16 inches.



MODEL 2224

Featuring patented "inverted jolt" mechanism, this semi-automatic Series 2000 *jolt-squeeze-strip* machine handles wide range of flask sizes. Seven models available with jolt capacities from 1500 to 4000 pounds.



MODEL 217

This SPO-MILWAUKEE *jolt-squeeze-rollover-draw* machine combines all operations in simplest possible cycle for fast production of drag molds. Three models available (16, 21 and 30-inch squeeze pistons).

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IMPELLER CASTINGS ARE MADE WITH CO_2 PROCESS

Molder is working on bottom of three sections which make up flask for impeller castings. Center section is at the left front, and top section is at right rear. In front of it is an aluminum pattern for the complex impeller casting

By C. A. PHALNIKAR
Chief Metallurgist
Kirloskar Brothers Ltd.
Kirloskarvadi, India

MOLDING an impeller casting, with irregular, curved vanes, always has presented a difficult problem, but such a job now is made simple by our use of the CO_2 process.

C. A. PHALNIKAR

This article describes our latest experience in making four-vaned impeller castings for a 14 x 14-in. centrifugal, mixed-flow pump by the CO_2 process.

The impeller pattern is made in aluminum, with loosely fitted vanes, and the molding operation involves the use of three flasks. The pattern is placed without the vanes, on a wooden bottom board with the bottom flask. Regular foundry sand is shoveled in the flask and rammed. Excess sand is stripped off, and the flask is turned over and the bottom board removed.

The four loose pieces of the curved vanes are fitted in properly, and soapstone powder is applied carefully to the pattern. Bits of papers spread over the area covering the foundry sand serve with the powder as a parting medium. The middle flask is placed over the pattern, which is fitted with bolts and drilled holes from the sides at various spots. These bolts very nearly touch the vanes and serve as anchors.

A specially prepared CO_2 sand mixture then is shoveled into the flask. When this sand is rammed, special attention is given to the ramming around the vanes. An approximate parting is made, and holes are made directly in the sand and also through the holes in the side of the flask. Through these holes, CO_2 is passed. When the sand has hardened, the vanes are removed and set in place to make sure that the parting is done properly. If necessary, some sand in the vane area is filed away. Success depends wholly on this critical parting operation.

Soapstone powder is sprinkled over the sand, and bits of papers are inserted in the joint portion of the vanes. The top flask then is set over the middle flask. CO_2 sand is only used for facing and is followed by the

View shows impeller castings made by the CO_2 process in various positions

regular foundry sand. After the sand has been rammed and the excess stripped, holes are made from the top surface of the flask. The passage of CO_2 through these holes hardens the CO_2 facing sand.

The top flask is removed first; then the four curved vanes. This procedure facilitates removal of the middle flask and of the pattern from the bottom flask. The three flasks are shown separately in the accompanying view after removal of the pattern. A specially prepared facing solution containing self-firing compound is sprayed over the sand. Care must be taken to insure that the solution covers the entire surface of the vanes satisfactorily. Burning off the solution results in a smooth, blackened surface.

The mold is closed, and phosphor bronze is poured from two sides. Several views of the 90-lb casting are shown here. The casting exhibits extremely fine surface finish.

Magnesium Association Plans Program for Chicago Meeting

Tentative program of its 12th annual convention has been announced by the Magnesium Association, New York. To be held Oct. 4-5 at the Drake, Chicago, the meeting includes a luncheon on Thursday and another on Friday. Examples of modern equipment engineered in magnesium will be shown, and experts will discuss selection and use of magnesium in various fields.

Subjects will cover applications of magnesium in such fields as aircraft, motors, automotive vehicles and electronics equipment, as well as in the outer space satellite. A panel-type discussion will be held on Thursday afternoon to review progress in the working of magnesium. Ten experts will discuss specific fields of interest.

"Jones, of all the darned fool places to stick your bubble gum how did you happen to pick the coreblower?"

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Investment Casting Institute Will Hold Detroit Meeting

The fourth annual meeting of the Investment Casting Institute will be held Nov. 13-15 at the Sheraton Cadillac Hotel, Detroit. In addition to its regular three-day program, the institute has invited some of the nation's top authorities on vacuum melting to participate in a vacuum metals symposium on Nov. 16 to evaluate practical advantages of vacuum melting in investment casting.

The special symposium is open to all companies and all individuals interested in vacuum melting. Registration fee is $25, and details are available from the ICI, 27 East Monroe St., Chicago 3, Ill. Chairman is Dr. Jack Keverian, General Electric Co.

The three days of the regular program are open only to institute members. They include director and committee meetings on Nov. 13, the business session on Nov. 14 and the technical session on Nov. 15. Details of both the regular program and the symposium follow:

Tuesday, Nov. 13
Directors and committee meetings
Wednesday, Nov. 14
Business Session—A panel analysis of "Costing Problems in the Investment Casting Industry" and committee reports on ICI activities. The latter will include a discussion by K. W. Thompson, Thompson Tool Co., who is completing plans for ICI members to tour investment casting plants in Europe.
Thursday, Nov. 15
Technical Session—Features include a demonstration and discussion of "The Glascast Process" by Dr. N. J. Grant, Massachusetts Institute of Technology, ICI consultant; a paper on "The Relationship Between Liquid Metals and Ceramic Mold Surfaces" by Prof. Howard F. Taylor, MIT; a discussion of "Use, Applications and Problems of Soluble Cores" by C. W. Schwartz, Misco Precision Castings Co.; and a special panel discussion of "Techniques and Controls for Investing and Precoating."
Friday, Nov. 16
Vacuum Metals Symposium—"Vacuum Melting—Past and Future," Dr. N. J. Grant, MIT; "Influence of Vacuum Melting on Properties of Various Materials," Dr. R. K. McKechnie, General Electric Co.; "Comparison of Various Vacuum Equipment and Operational Technology," J. H. Moore, Vacuum Metals Corp.; "Use of Molding Materials and Refractories for Vacuum Casting," H. O. MacIntyre, Battelle Memorial Institute; "Economics of Vacuum Melting and Casting," Dr. F. N. Darmara, Utica Drop Forge Co.; and "Summary: The Case for Vacuum Melting," Dr. Howard F. Taylor, MIT.

Gas Association Will Meet

The 38th annual convention of the American Gas Association will be held in Atlantic City, N. J., Oct. 15-17. A major purpose of the convention is to provide a forum where industry's advances in research, advertising, promotion, sales and operations can be aired. Progress and promise of the air conditioning industry and a report on the Harvard University electronics research project are two of the subjects to be covered during the meetings.

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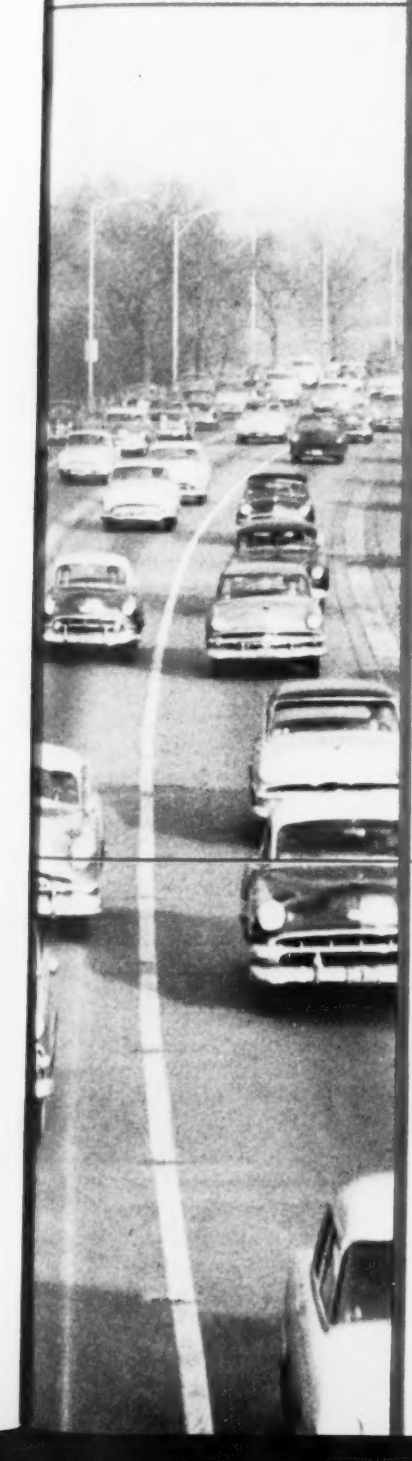


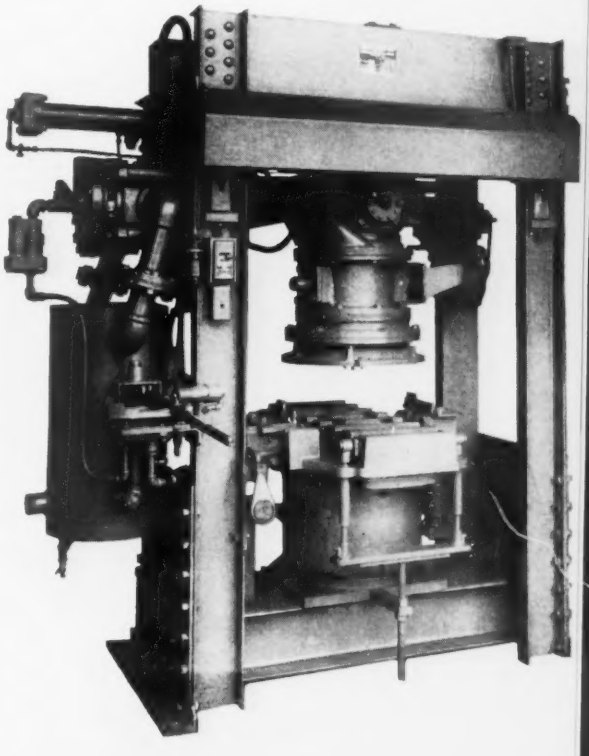
the DEMMLER 103

Since the days of the "horseless carriage" the name DEMMLER has meant the ultimate in fine core blowing machinery. Today — more than 45 years later — the modern Demmler 103 is meeting casting production demands of the nation's leading automobile manufacturers.

The Demmler 103 core blower is a stationary magazine type machine capable of blowing ANY core or molding sand into cores weighing up to 50 lbs. It is hard-blowing and extremely efficient. All air-operated, the 103 is carefully designed to minimize maintenance.

It's fast, too. The cycle of operation is 6 seconds maximum and it has produced as many as 2,000 cores per hour on a foundry production line.

The Demmler 103 can be equipped for fully automatic, semi-automatic or manual operation.



QUALITY - Built-into Every Core Box Vent

It's sound judgement to choose core box vents from a company which pioneered the manufacture of core blowers. Demmler engineers are constantly improving vent designs and developing new types. The HL 150 mesh vent, for example, is a special design for various applications including D-process shell molding. Brass-slotted, steel-slotted and screen types are available in sizes to meet every application.

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Foundry Developments

By EDWIN BREWER
Metallurgical Editor

INVESTIGATION of a method to eliminate a defect termed "measles" in a cast 11.5 to 14.0 per cent chromium steel poured in green sand indicates that coating the mold face with aluminum paint corrects the trouble. It is described in an article, "Surface Defects in Some Sand-cast Stainless Steels" by Waters, Hayward and Taylor, in the Aug. 2, 1956, issue of *Foundry Trade Journal*. The defect, evident as a pitted appearance on the surface, does not occur with dry-sand molds. Leafing type aluminum paint is sprayed on the mold face and then flame dried to burn out the volatile vehicle. Drying is considered sufficient if the surface no longer ignites when the flame is held over it.

Tests Surface Adhesion

RESEARCH in the development of an accelerated performance test for surface-treated magnesium alloys is described in a recently released Air Force report. Corrosion resistance tests included pH increase in 1N KCl, open-circuit potentials comparisons, short-circuit current comparisons, and hydrogen evolution rates in 1N KCl (gasometric method). Tests of adhesion of zinc chromate primer to the treated surfaces included adhesion in shear, adhesion in tension, impact, ultrasonic vibratory, and pressure-sensitive type tests (qualitative). The gasometric method was found the most promising for evaluation of corrosion resistance. Report is PB 121140, "Research on Treated Magnesium Surfaces" by S. E. Rohowetz, and may be obtained from the Office of Technical Services, Department of Commerce, Washington 25, for $4.75.

Pouring on the Heat

FIVE years of research into new methods for the production and maintenance of extremely high temperatures in special furnaces is summarized in a final report available through the Office of Technical Services, Washington 25. The report covers combustion of gases and of metals. Studies of combustion of metals included ignition temperatures and burning characteristics of metals, centrifugal reactors, combustion at high and low pressures, combustion of fluorine, metal vapors, liquid metals and metal powders, and thermodynamics of metal-oxygen systems. The report is designated PB 121024, "Office of Naval Research High Temperature Project," and the price is $1.75.

Removes the Dust

DUST problem created in cleaning of castings is being given continuing attention by the British, and some of the developments in carrying away dust generated by pneumatically operated chisels and by small portable grinders is described in "Foundry Dust" by Lawrie, Holman and Morgan in the Aug. 9, 1956, issue of *Foundry Trade Journal*. In the case of the chisels a rubber sleeve with or without a cone extension is slipped over the chisel to within an inch of the cutting edge. The sleeve contains pairs of small ducts above and below the chisel edge which lead into a $\frac{5}{8}$-in. plastic hose. Vacuum of 5 in. of mercury with the arrangement will extract 6.5 cfm of free air and carry the dust away. On portable grinders an extractor head is used with two ports to pick up the dust. A head suitable for wheels 1 in. wide extracts 40 cfm of free air at 5 in. of mercury which is conducted away in a $\frac{3}{4}$-in.-diam plastic hose.

Lead Raises Ned

ACCORDING to a research report "A Note on the Subversive Influence of Titanium and Lead in Nodular Cast Iron" by J. V. Dawson in the April, 1956 issue of *Journal of Research and Development* (Birmingham, England), titanium alone up to 0.1 per cent is tolerable when no lead can be detected, but in the presence of 0.003 per cent lead, 0.1 per cent titanium is completely damaging.

Gets Around Roadblock

MAJOR roadblock in the development of the first practical all-aluminum automotive engine is said to have been removed by spraying a thin coat of wear-resistant steel on the cylinder walls of the aluminum block. Procedure was engineered by Aluminum Co. of America in co-operation with Metallizing Engineering Co. Inc. Problem of adherence of the steel coating to the aluminum was overcome by first spraying the aluminum with a very thin layer of pure molybdenum, and then spraying on the steel. It is said that the thin coat of steel on the cylinder walls does not affect the expansion and contraction of the aluminum and enables the use of aluminum pistons without special slotting or any other type of expansion control devices.

Has Good Properties

DEVELOPMENT by the Navy of a useful 12 per cent chromium steel modification without columbium is described in report PB 121226, "Investigation of Modified 12 Per Cent Chromium Steels for Intermediate Temperature Applications." It is available from Office of Technical Services, Washington 25, for 75 cents. The report describes creep-rupture properties of 12 per cent chromium steels modified by additions of molybdenum, vanadium, columbium, titanium and carbon. Tests were conducted at 1100 and 1200°F for materials as-cast, cast and homogenized, forged and normalized, and forged, normalized and tempered. A modification containing 1.0 per cent Mo and 0.7 per cent V showed creep - rupture properties which compared favorably with the best of the columbium-free alloys developed so far.

Slicks Surface

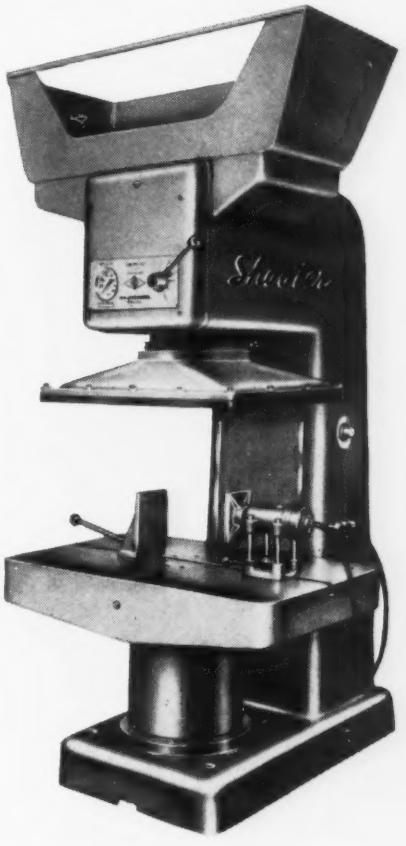
BLACKING suitable for coating molds produced by the CO_2 process is composed of 1 gallon isopropyl alcohol, $1\frac{1}{2}$ lb blacking, 2 lb plumbago and $\frac{1}{2}$-lb urea formaldehyde resin, according to A. I. Donaldson in the May 24, 1956 issue of *Foundry Trade Journal*. Mixture needs to be stirred constantly to keep the solids in suspension. Applied by brush or spray to the mold face, the coating is ignited immediately to eliminate the alcohol and cure the resin, resulting in a hard face on the mold. The sand mixture used is composed of 89 per cent sea sand, 3 per cent western bentonite, $1\frac{1}{2}$ per cent pelleted pitch, $1\frac{1}{2}$ per cent water, 4 per cent sodium silicate binder, and 1 per cent molasses. Sand has a green strength of 5.5 psi and a permeability of 150.

SHOOTING CORES

with

"DAVENPORT" HANSBERG SHOOTER

Hansberg Shooters can shoot intricate, precision cores in less time, at a lower cost per core, because the sand is pushed into the cavity by air instead of being carried in with air. The sand absorbs the pressure shock and no air leaves the shooter with the sand.



HANSBERG, THE ORIGINAL SHOOTER

There are no moving parts in the Shooter. Cores can be shot in wooden boxes without special attachments and without causing wear because there is no sand blasting action. Venting of boxes can be reduced to a minimum since the propelling air does not mix with the sand in the magazine. The only venting required is for the air in the box.

NO SIDE POST

The Hansberg Shooter has no side posts. It is open on three sides permitting conveyor operation. The height of the Shooter table is adjusted by finger-tip control due to the air-on-oil hydraulic feature, thus doing away with slow hand operated spindles and wheels. There are no spindles for the oil-pneumatic side clamps, and when not used they can be removed and put aside for further freedom of operation. These features increase production in any kind of a set-up.

OVER 2,000 IN USE

Most Hansberg Shooters are used for the regular production of oil or green sand cores. However, the fact that the air does not mix with the sand makes the machine ideal to handle sands bonded with sodium silicate for the CO_2 process. More than 2,000 Hansberg Shooters are in use in the U.S.A. and Europe. They have been found to be practical also for making hollow shell-cores and shell-molds. Thus, the Hansberg Shooter is the most universal machine in the foundry, being adaptable for cores in any process.

FOUR STANDARD MODELS. Core weighs: 4 lbs., 17 lbs., 42 lbs., and 88 lbs. Write for further information.

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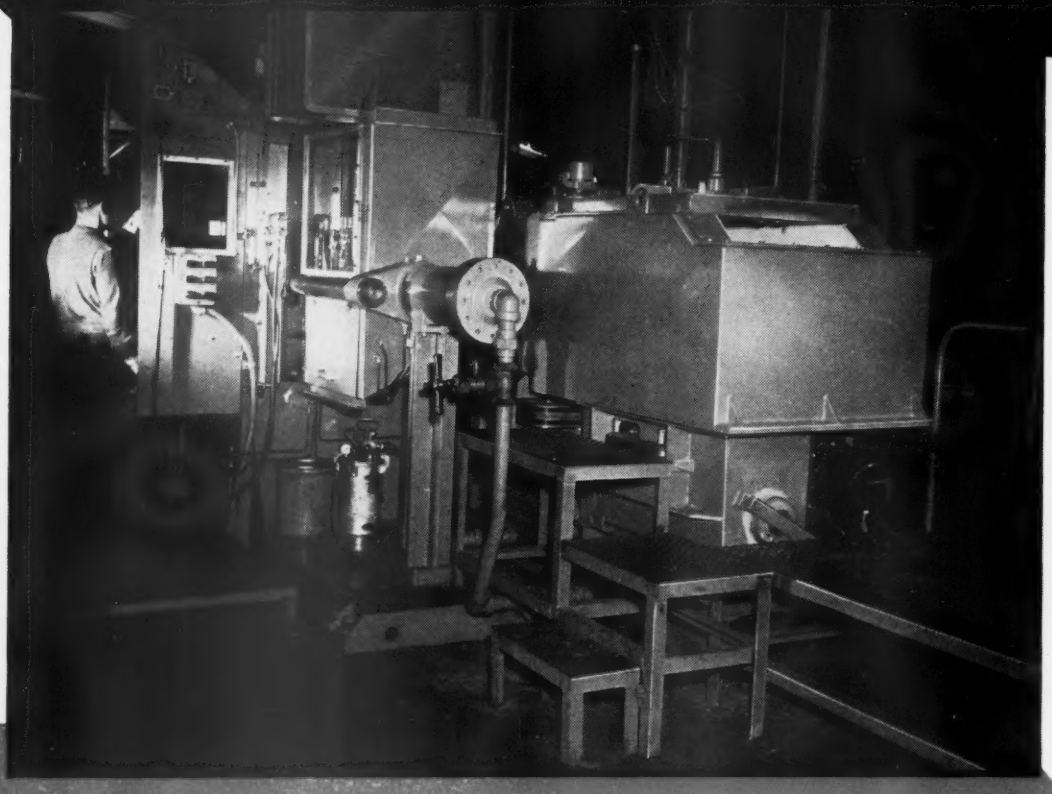

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How To Maintain
COMPRESSOR and AIR-OPERATED
Equipment

By JOHN D. CRAY
Compressed Air & Gas Institute

LIKE any other businesses, foundries want to produce goods at a profit. One of their widely used tools is compressed air, use of which very probably will continue to grow. Proper care and maintenance of compressors and air-operated equipment will help foundrymen to achieve profitable operation.

Compressors and compressed air equipment require relatively little maintenance, but they should not be neglected. If care is used from the time the equipment is installed, maintenance costs are reduced and chances of forced shutdown practically eliminated. It is the purpose of this article to point out some common operating problems and to suggest remedies for them.

The compressed air system in any foundry can be broken down as follows: 1. Compressor and its immediate accessories. 2. Receiver and distribution system. 3. Various tools which use compressed air.

Compressor and Accessories — Proper care of the compressor and

Fig. 1 (above)—Air flow pattern of typical pipeline aftercooler and moisture separator

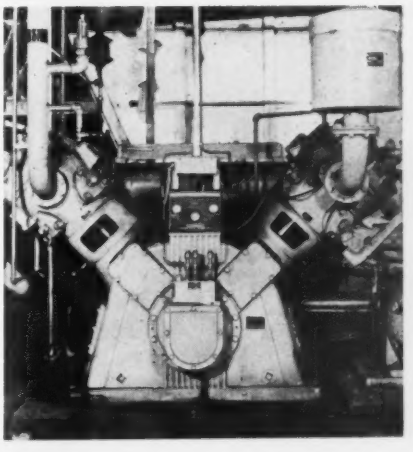
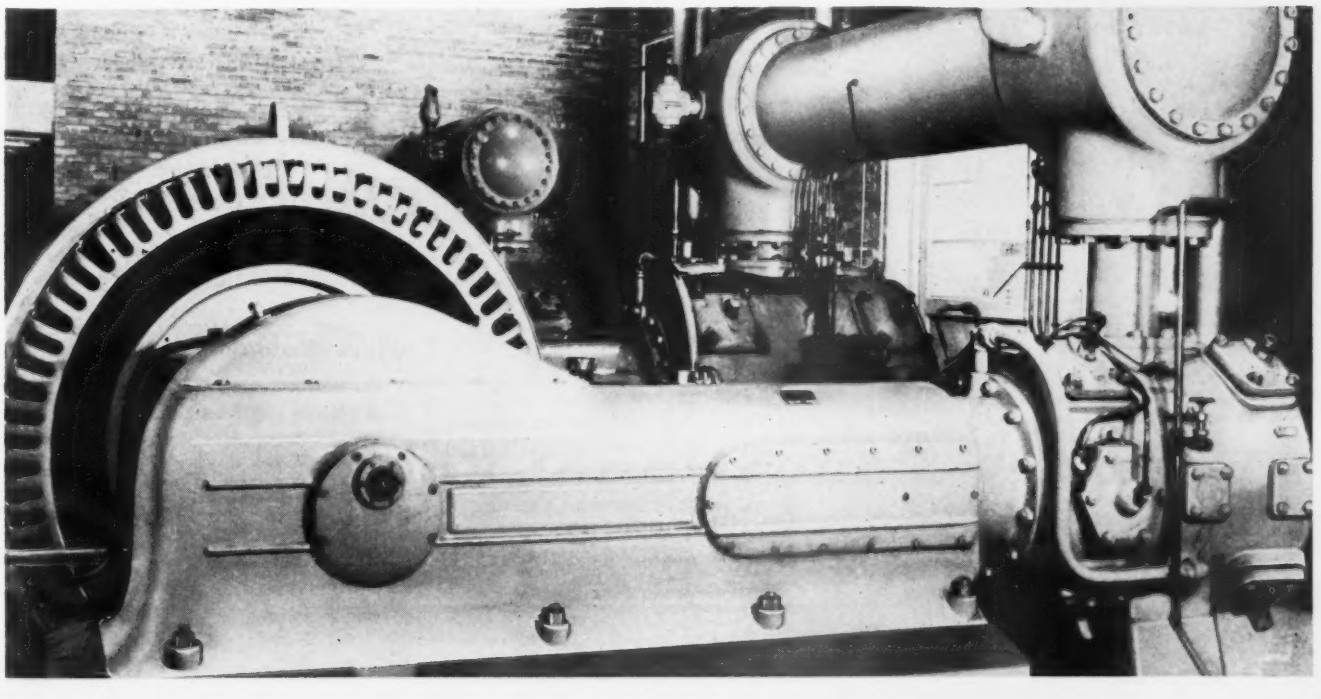


Fig. 2 (right)—Vertical-angle air compressor installed at a Midwestern utility plant. Note inside air intake and relief valve in discharge line

Fig. 3 (below)—Horizontal two-stage compressor of duplex type installed in a smelting plant. Note the relief valve installed on the intercooler



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Over the past nine years, as you can see from the accompanying chart, F.E.F. has made great strides in that direction. Sixty-four departments now require students to study the cast metals industry, as compared to only twenty in 1947.

This advancing trend will assure a continuing flow of capable, well-educated young men into our industry . . . **providing** your interest and financial support are maintained now and in the future.

DEPARTMENTS REQUIRING CAST METALS STUDY

20	1947
64	1956

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Foundry Educational Foundation

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its accessories will increase the efficiency of the entire foundry operation.

The compressor must have proper lubrication. The film of oil between the cylinder and piston rings not only reduces friction and resultant wear, but also prevents air from slipping past the rings. If the lubrication system is checked periodically and investigation shows that all oil passages are free from obstructions, the compressor will not run dry.

If the compressor has stood idle for any length of time, it is good practice to pump the lubricator a few times to make sure that oil drained from wearing surfaces is replaced.

Recommends Oils to Use

The quality of oil used for the frame running gear is different from that employed in the compressor cylinder. For general use the following may be used for lube oil selection:

Crankcase Oil—A good grade of mineral oil should be chosen for running gear lubrication. A viscosity of 150 to 200 seconds Saybolt Universal at 130°F is suitable, but depends on the surrounding temperature. In general, a higher viscosity is used for higher temperatures.

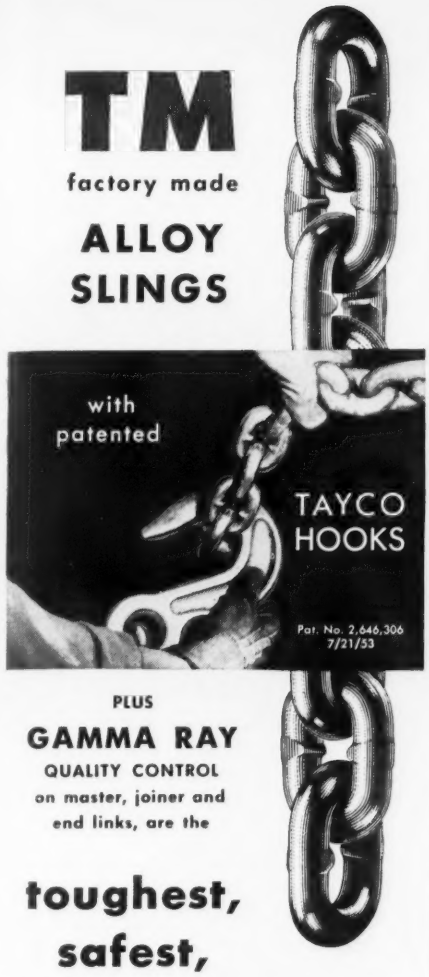
Compressor Cylinder Oil — The compressor cylinder lubricant is force-fed by a mechanical lubricator. For general use, a straight-run mineral oil with a flash point of 375 to 400°F and an approximately viscosity of 55 seconds Saybolt Universal at 210°F is suitable when the air is clean and dry.

The manufacturer's lubrication charts should be followed at all times. Keep in mind that too much oil is as bad as too little. An excess of oil in the compressor cylinder causes oil carry-over and results in heavy carbon deposits in the discharge line.

A great many symptoms indicate trouble spots in the compressor itself. On multistage machines, the intercooler pressure is a "pulse," where fluctuations can indicate trouble.

A radical drop in interstage pressure is a strong indication of a leak somewhere in the low-pressure cylinder. Conversely, when the interstage pressure rises, look for leaks in the high-pressure cylinders.

The leaks we speak of are mostly in the cylinder valves. An experienced operator usually can trace the faulty valve by testing the valve-cover temperature. If the cover is excessively hot, it is fairly certain



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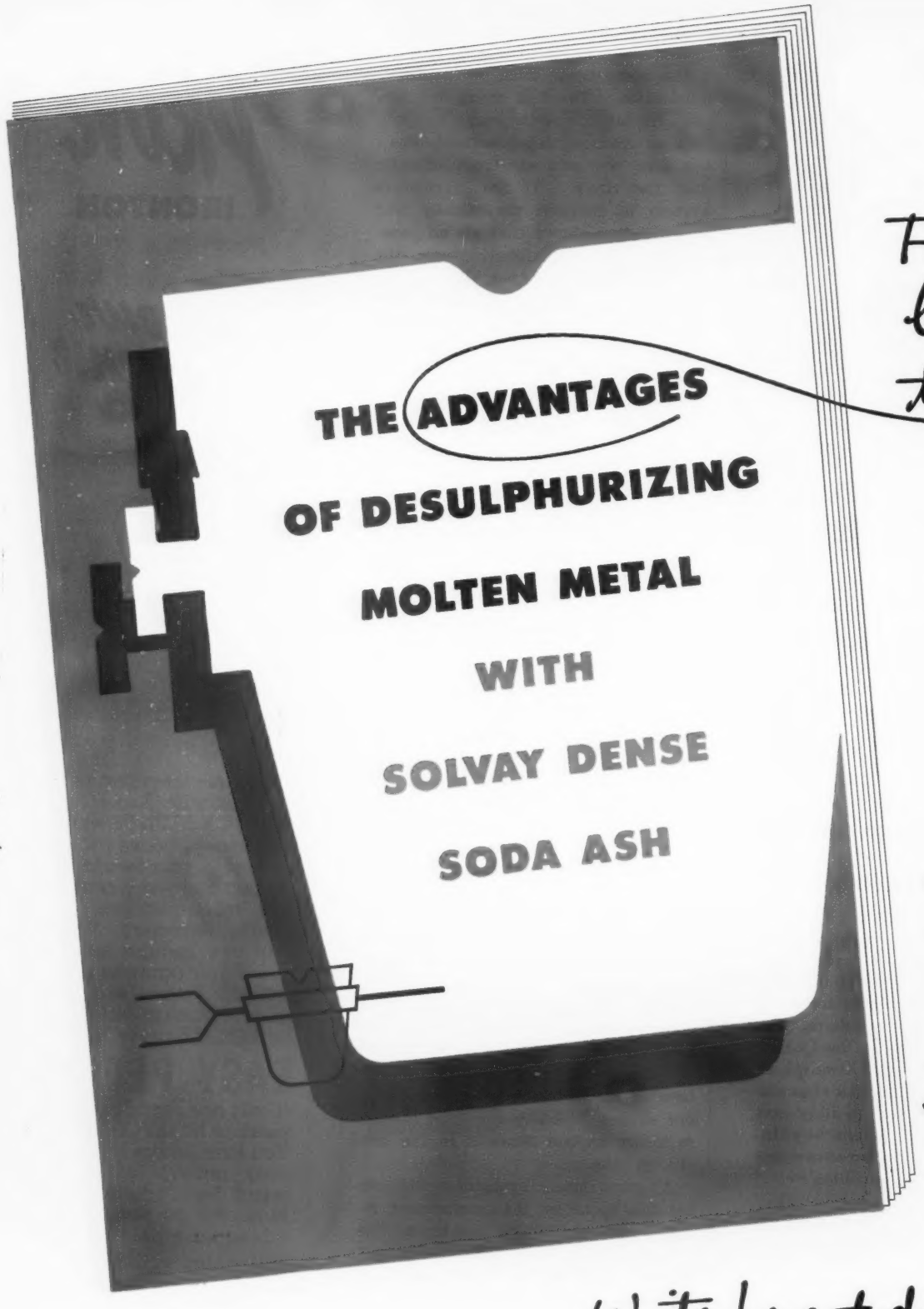

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that the trouble has been pin-pointed. Another indication is a change in the valve operating sound, such as "chattering."

Keeping an accurate check on the discharge air temperature always is good practice, for that temperature also is a pulse for trouble shooting. A rise is a strong indication of leakage in the valves or piston rings, inadequate cooling of the cylinders or air between stages.

Water Jackets Must Be Clean

If the discharge air temperature continues to rise after mechanical parts have been checked, it may mean that the cylinder water jackets are becoming clogged. This difficulty is especially possible where river water or other untreated raw water is employed for cooling. River water causes lime or magnesium deposits which cut down the effectiveness of the heat transfer surface. The obvious remedy is to clean out the jackets thoroughly. When mineral deposits are present, the jackets should be soaked in hot caustic or muriatic acid solutions.

It also is essential that the suction filter be properly selected and maintained. The filter should be placed in a location where only the cleanest air will be admitted. If it is practical, this location may be outside the foundry building. Fig. 2 shows an installation where, for expediency, the filter was located close to the suction flange of the compressor. To prevent unnecessary shutdowns due to direct clogging of the filter, definite time schedules should be set up for changing and cleaning the filter media.

Before compressed air is used, it should be cooled to a suitable working temperature. When compressed air is cooled, water in it condenses. If this water is allowed to escape to the equipment in the system, corrosion and excessive wear swiftly occur. Large amounts of water carried to the core blower will harmfully increase the moisture content in the sand delivered to the mold. To cool the air properly and to remove condensed moisture, an aftercooler and moisture separator combination is employed. (Fig. 1.)

The aftercooler is placed as close to the compressor cylinder discharge flange as possible. This is done to prevent moisture from condensing in the discharge pipe and to minimize thermal expansion in the line. Many installations have a pipe-line type aftercooler and moisture separator combination. These coolers generally are designed to cool the air to

Foundrymen!

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CUT ✓COSTS . . .

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SCIENTIFIC MATCH PLATES

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2520 West Lake St., Chicago 12, Ill.

Circle 671 on Inquiry Card—Page 219

Low cost 3/4 inch lining of CARO-LINE handles 120 ladles of iron

All-day operation at high temperatures has proved that *IRONTON* CARO-LINE can deliver superior service in any malleable iron or electric steel ladle. One Ohio malleable foundry pouring iron at 2860° F. fills its 250 lb. ladle 120 times before relining. The economy key is in the thickness of the lining—only ¾ of an inch! If you melt

MALLEABLE IRON AND ELECTRIC FURNACE STEEL

you ought to know more about CARO-LINE. Ironton makes this highly siliceous refractory for "grief proof" linings in ladles and furnaces. Saves labor, ends scrap loss, furnace repairs, slaggy metal.

Ask Ironton to send the "MAN WHO KNOWS" to your foundry for on-the-spot consultation.

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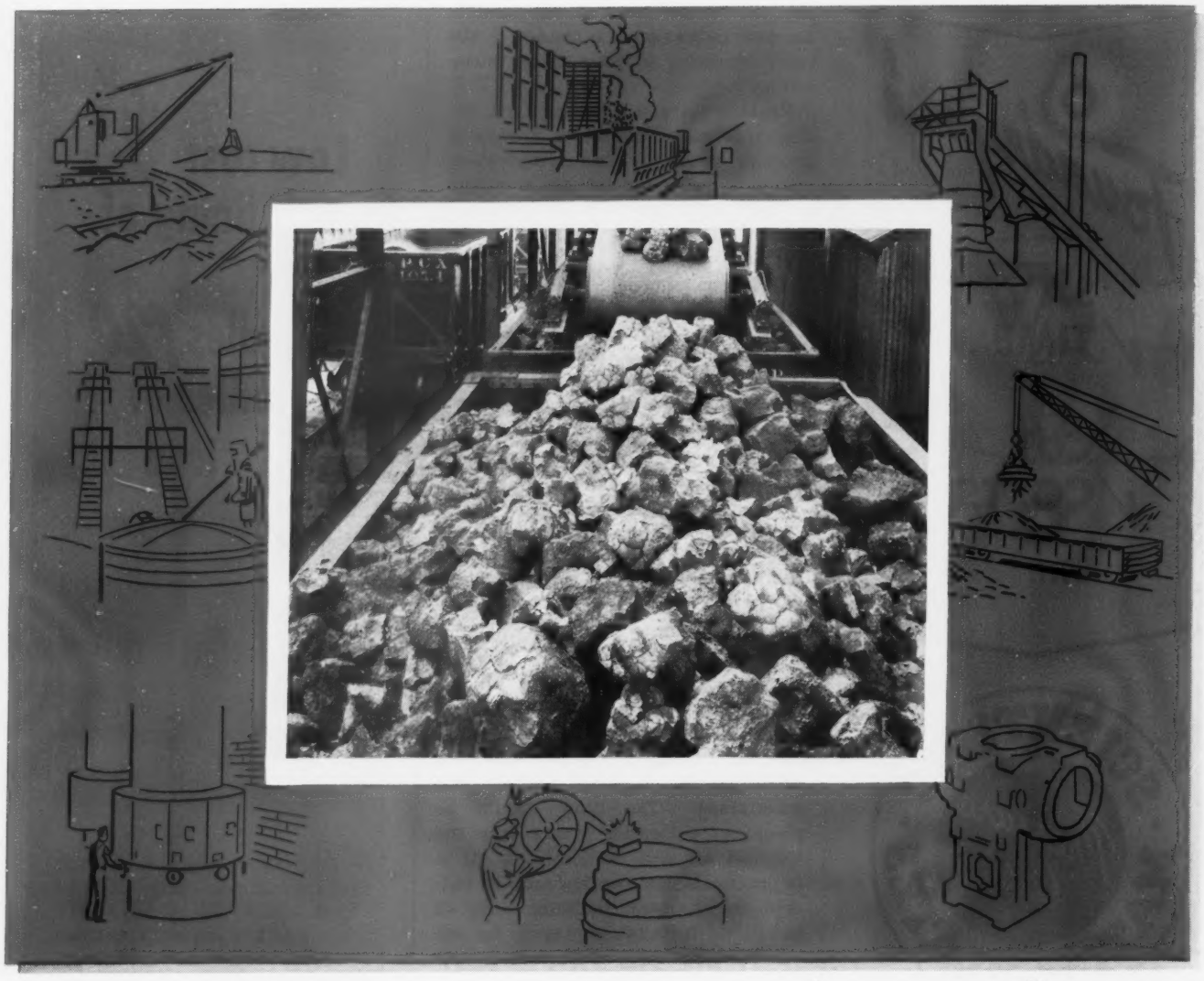
1328 Ashtabula Street

Reliable Refractories

Write for name of nearest Ironton man, or telephone Ironton 109

Circle 672 on Inquiry Card—Page 219



NEVILLE FOUNDRY COKE means *Assured Quality*

From Coal to Castings

When we talk about *assured quality* in coke, we like to be specific. In the first place, Neville Foundry Coke is carefully processed from clean, washed coals which contain a high percentage of Pocahontas. This care, plus close scientific control of production, assures you of a coke that is stronger, denser and more uniform—with more fixed carbon and less ash and sulphur. In fact, we're so *sure* of the quality of Neville Coke that we *guarantee* it to meet your rigid specifications. This *quality-guarantee* is your assurance of maximum temperature at the nose of the tuyere and hotter, cleaner, more fluid iron.

As a merchant coke producer, operating four batteries of ovens, Pittsburgh backs up this guarantee of quality with a guarantee of reliable, continuing supplies . . . today and in the future. Wouldn't you like to enjoy these benefits in *your* foundry? Then specify *Neville* on your next coke order.

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within 15 degrees of the temperature of incoming water. The cool air then passes through a cyclone type moisture separator, which removes the condensed moisture.

If the aftercooler is not giving proper service, the tube bundle should be removed and all surfaces given a thorough cleaning. Mineral deposits will form in the aftercooler, just as in the cylinder water jackets.

Another cause of inefficiency in aftercooling is the deposit on the tubes of oil from the compressor.

Receiver and Distribution System—When the foundryman designs his compressed air system, he knows what pressures and capacities are required. To realize these needs, leakages in the piping system must be eliminated and excessive pressure drops avoided.

The piping should be sized so that the pressure drop in the whole system does not exceed 10 per cent of the pressure at the compressor discharge flange. Regular inspection of all connections must be made to locate and stop leaks.

Sharp turns and constrictions in the piping system must be avoided; otherwise efficiency of operation will be low.

Since output of a pneumatic tool depends on pressure, inadequate or undersized piping increases the time the tool requires to do its job, and production costs increase.

The receiver is an important part of the system. Its purposes are to eliminate surges in the air supply, to provide a point of constant pressure for compressor control take-off, to act as a reservoir when demand increases suddenly and to trap entrained moisture and oil. The moisture and oil which collect in the receiver should be drained regularly to prevent rusting. Some installations pipe from the drain to an automatic moisture trap. In a large compressed air system, as in a foundry, more than one receiver is needed. The additional vessels should be placed in locations to handle heavy instantaneous peak demands.

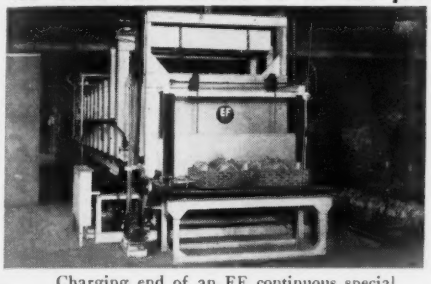
Compressed Air Tools—The types of equipment which use compressed air in the foundry are numerous. They include core making machines, molding machines, air hoists and pneumatic cylinders, pneumatic tools, clamps and many others. New devices are being developed rapidly.

Each device uses some form of air cylinder and piston to transmit mechanical energy. For this reason most of the same principles of maintenance employed in the compressor itself can be used for the air device;

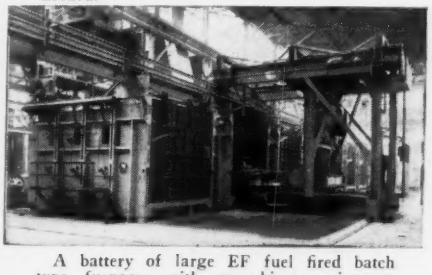
EF FURNACES

Electric or Fuel Fired
Continuous or Batch Types

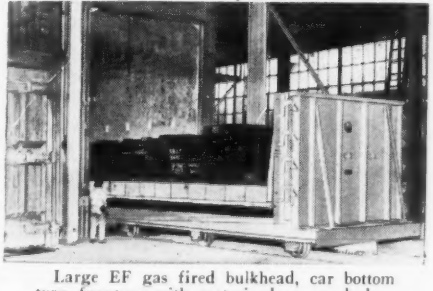
We build the furnace to fit the job



Charging end of an EF continuous special atmosphere furnace handling short cycle malleable castings. Shows 2 baskets of castings ready for pushing thru furnace in 2 parallel rows. The castings are uniformly treated in a special atmosphere produced by an EF generator—no packing material is needed.



A battery of large EF fuel fired batch type furnaces with quenching equipment. Gantry crane handles large castings or other products into and from the furnaces or quench. This type also used for annealing, normalizing and other heating and quenching processes on weldments, forgings, plate, coiled strip and other products.



Large EF gas fired bulkhead, car bottom type furnaces with motorized car and door operating equipment and automatically controlled heating zones are used for uniformly annealing large castings, stress relieving weldments and other processes.

Foundry Bulletin No. 461
shows typical installations of EF Gas-fired, Oil-fired and Electric Furnaces
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GAS-FIRED, OIL-FIRED AND ELECTRIC FURNACES FOR ANY PROCESS, PRODUCT OR PRODUCTION

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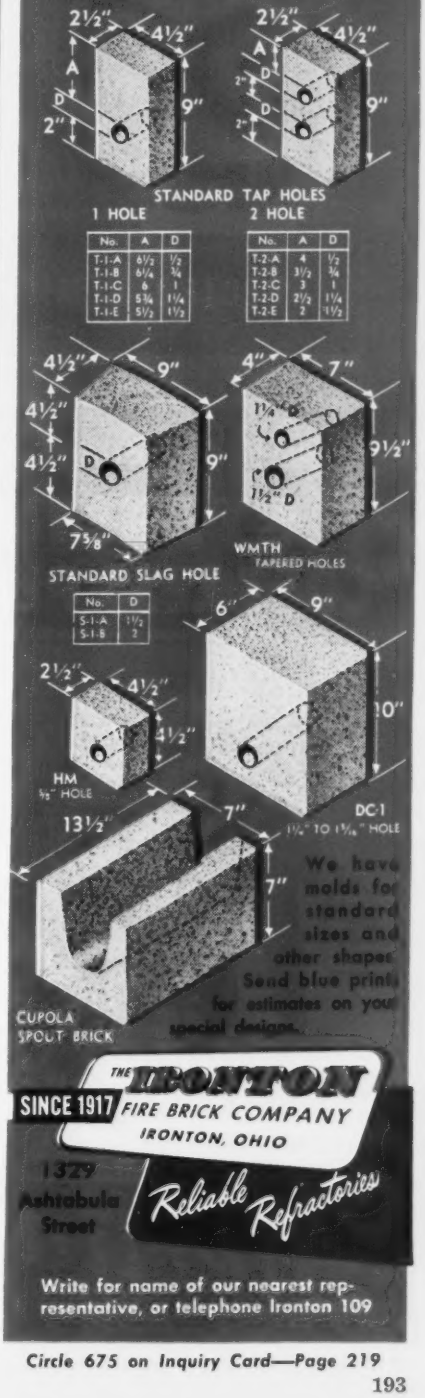
Circle 674 on Inquiry Card—Page 219

STEP UP PRODUCTION with IRONTON TIME-SAVING SPECIALTIES for CUPOLAS



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Circle 675 on Inquiry Card—Page 219

Quantometer Analyses Service at Surprisingly Low Cost . . . for

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- DUCTILE IRON
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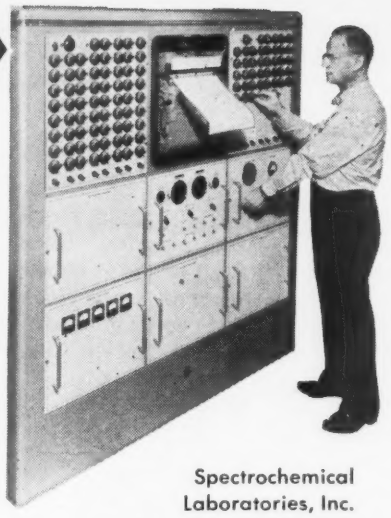
- STEEL
- ALUMINUM
- TITANIUM METAL
- ZIRCONIUM METAL
- WHITE METALS



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Phone FRemont 1-5100, Pittsburgh, Pa. or write today for complete information.

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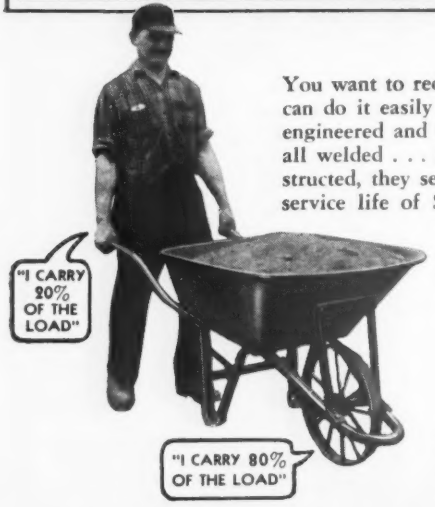
Circle 676 on Inquiry Card—Page 219

Any Way You Figure It...
STERLINGS COST LESS PER YEAR



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Sterling WHEELBARROWS

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Circle 677 on Inquiry Card—Page 219

the most important of these is lubrication. Although a great deal of oil need not be used, periodic inspection is necessary to make sure the moving parts will not freeze up.

Safety Devices—In any compressed air system, protective devices are essential for the life of the compressors and its components.

Shutoff valves in the discharge line of the compressor always should be preceded by a safety valve. If the unit is working with valve closed, the high pressure will escape through the safety valve rather than build up.

The importance of the discharge air temperature as an indication of trouble in the compressor was explained earlier. Some installations employ thermostatically controlled devices which either automatically increase the cooling water flow or shut down the machine with an increase in air discharge temperature.

Even with such automatic devices, it still is important to keep a check of operating temperatures visually, by means of thermometers or other temperature indicators.

Careful maintenance is, in itself, a safety device which not only protects the compressor and air systems, but also increases efficiency and decreases costs of operation.

Manual Tells How To Set Up A Supervisory Newsletter

A new publication of the American Management Association is a 90-page how-to-do-it manual for executives who are planning to establish a supervisory news letter in their companies or to strengthen and improve one already in existence.

"Developing Effective Supervisory Newsletters: A Guide to Better Communication" is the work of Robert Newcomb and Marg Sammons. It presents basic principles and practical suggestions which cover all phases of newsletter development—initial planning, getting supervisory participation, preparing copy, devising a format, production, distribution, etc.

The publisher is the American Management Association, 1515 Broadway, Times Square, New York 36, N. Y. Price is $3.75 to nonmembers, $2.50 to members.

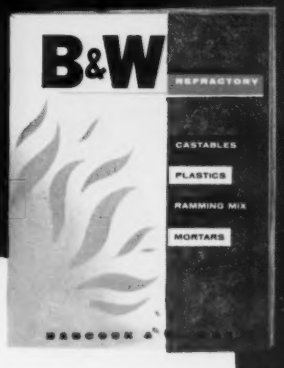
Will Represent Coles Cranes

Coles Cranes Inc., Joliet, Ill., has appointed W. S. Murphy Co., 598 Ponce de Leon Ave. N. E., Atlanta, Ga., to be distributor of its complete line of mobile cranes in the Georgia area.

What are your refractory castable problems ?

- High Temperatures?
- Abrasion and Erosion?
- Slag Attack?
- Overhead Applications?
- Insulating Properties Required?

B&W makes a wide range of specialized refractory castables. Whatever your problem, you will find helpful data in B&W Bulletin R-35. Send for your copy today.



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Circle 678 on Inquiry Card—Page 219

Around the Country

NEWS REPORTS FROM

Philadelphia . . . Chicago . . . New York . . . Pittsburgh

Pittsburgh— Foundries report an increasing demand from auxiliary equipment builders, as steel mills plan for operations close to 100 per cent of capacity in fourth quarter. There's heavy demand for replacement of most types of steel mill equipment, and mill expansion programs are expected to contribute to strong needs for machinery during the remainder of this year.

Mesta Machine Co.'s recently-acquired New Castle, Pa., foundry has received some castings for machining and patterns. Mesta officials have finished cleaning and aligning of machines and are now repairing open-hearth furnaces, which were idle for more than one year. The company will operate one 35-ton open hearth, two 50-ton furnaces and one 100-ton furnace at New Castle. Two of the furnaces have been rebuilt, and two others are to be rebuilt before foundry operations can be started.

Mesta officially took over the formerly government-owned foundry and machine shop in late July for $8 million. The plant received its first shipment of sand and scrap late in August.

Philadelphia— Gray iron foundries engaged in heavy work are faced with an increasing amount of business. They are operating a full five days a week—in some instances longer—and are having difficulty obtaining sufficient molders. Backlogs range eight to ten weeks.

Shops engaged in light squeezer work are being less pressed. Most of them are working five days a week, but they have no more than two to three weeks' backlog and are not confronted with quite the skilled labor shortage noted in the larger shops, where work is heavier and not infrequently more complicated.

Specifications for large gray iron castings are particularly active for paper-making machinery, plastic manufacturing machinery and for steel mill equipment, including notably at the moment sintering plant equipment. Despite depressing seasonal influences, which were pronounced in July and to a lesser degree in August, producers of heavy castings experienced a good third quarter and look for the fourth quarter to be even better.

Operations at steel foundries also reflect the strong wave in heavy industrial equipment demand. Almost

Now in operation, this new production foundry is operating continuously over two 8 hour shifts, employs 2,000 workers and is pouring 1000 tons of gray iron every 16 hours. Cores and molds are baked and dried in Despatch Ovens.

DESPATCH OVEN FEATURES

Increased Production—100% convection heat and up to 75% recirculated air give speedy warm up, fast heat recovery after reloading and fast baking.

Quality Baking—Heavy duty, high volume fans give speedy heat transfer, assure uniform baking.

Approved Control—Despatch ovens are equipped with automatic temperature controls and fire underwriter approved safety systems.

Efficient Operation—Direct gas or oil fired heaters cut fuel costs . . . for more information about Despatch Foundry Ovens . . .

Write for Bulletin 31, or request a representative call.

Minneapolis Office: 619 S.E. 8th St. Chicago Office: 4554 N. Broadway

Sales and Service in all Principal Cities

DESPATCH OVEN COMPANY

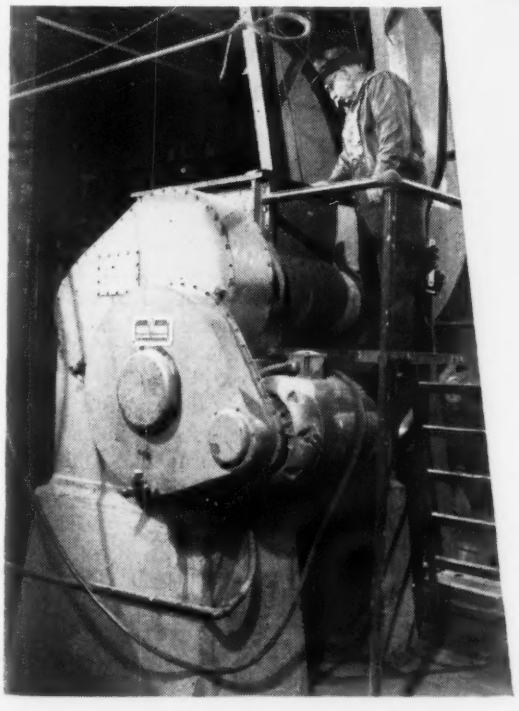
PIONEERS IN ENGINEERING HEAT APPLICATIONS FOR INDUSTRY

Circle 679 on Inquiry Card—Page 219

"This mixer improves our sand and helps us turn out better castings"

says L. A. Cline, manager of Saginaw Foundries Co., about their Baker-Perkins Unidor Core and Molding Sand Mixer

Like many other plants, Saginaw Foundries Co.—a job foundry in Saginaw, Michigan, making a variety of steel castings for automobiles and general industry—has found that the B-P Unidor Mixer is a great help in producing better castings. With a Baker Perkins Unidor, the quality of molding and core sand can be greatly improved, and the number of scrap parts reduced. The Unidor Mixer rubs, stirs, and kneads the sand in one operation, and does not require special aerating attachments. You get complete efficiency from your sand binder, whether conventional or resin, because the powerful Sigma blades of the B-P Unidor distribute the binder in a uniform thin layer over all sand grains. The No. 15 Mixer shown here at work has a capacity of 13 cu. ft., and other sizes available range from lab models up to 30 cu. ft. Steel trough shells have replaceable steel liners, and the steel shoes on the cast steel blades are renewable. The Unidor can be equipped with jacket for heating or cooling. For full details contact a B-P sales engineer or write us today for our equipment bulletin No. F-156.



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Circle 681 on Inquiry Card—Page 219

without exception these shops are operating full, with backlog ten weeks and beyond and shortage of skilled molders a bottleneck. Reflecting higher costs of raw materials and labor, steel casting producers have increased prices about 10 per cent. The price trend is also up in other divisions of the foundry industry, although in gray iron it is not too noticeable for the reason that competition remains strong.

Malleable shops still look to pipe fittings and builders hardware for much of their business. Their operations also are bolstered by railroad requirements. In general, they are operating a full five days a week and have backlogs of seven or eight weeks. Situation in brass and bronze is spotty, although average operations are higher than they were 30 days or so ago. Except for some of the larger specialty shops business is still pretty much touch and go. Aluminum and magnesium foundries are busy.

Chicago— Gray iron foundries in the Midwest weren't hurt by the steel strike insofar as pig iron supplies were concerned. Reason was two-fold—first, inventories of iron had been built up in June in anticipation of a strike and certainty of a midyear price increase, and second, a number of blast furnaces serving foundries didn't suffer strike shutdowns. Many foundries spent July and August reducing iron stocks to normal proportions.

But what has happened pricewise in all raw materials is causing gray iron castings makers to be plenty upset. In August, pig iron prices were increased $2.50 a gross ton and oven foundry coke $2 a net ton. And if these matters weren't harassing enough, cast scrap prices have zoomed.

No. 2 foundry pig iron, f.o.b. furnace, Chicago, now is $63 a ton, compared with $59 a year ago. This is a jump of 6.8 per cent. Oven foundry coke today is delivered in Chicago at $31.82 a ton, against $27.25 a year ago. The increase of $4.57 represents 16.7 per cent.

Steel rails of 18-inch length were selling for $83 a gross ton in late August, or $25 more than the $58 price 12 months ago. This was a skyrocketing of 45 per cent. No. 1 cupola cast at $54 this year, compared with $47 last year, and No. 1 machinery at $58 versus $51 a year ago showed advances of 14.9 and 13.7 per cent, respectively.

These increased costs of raw ma-

A bold and ambitious marketing program conceived by the Gray Iron Founders' Society is already launched and under way. An experienced industrial Marketing Director has been appointed to the Society staff. An aggressive Marketing Committee of member foundries has been organized. Extensive resources of the Society have been allocated to give the program broad scope.

This major effort will result in an accumulation of facts about Gray Iron markets and selling strategy never before available to gray iron foundries. *Initial studies are already in progress.*

- **Existing Gray Iron markets will be more precisely defined.**
- **Profitable potential markets will be uncovered.**
- **Strong and weak points of competitive materials will be analyzed.**
- **Research and product development will be geared to market conditions.**
- **Selling methods will be refined.**
- **Buying influences will be pinpointed.**

This new and continuing program will enable every Society member to cut a profitable slice of the Gray Iron castings market for himself . . . by helping him to make his marketing efforts more productive . . . by expanding the total consumption of Gray Iron.

Results of the marketing program will be presented to Society members in bulletins, at marketing seminars, local sales clinics and management meetings.

Join these progressive foundrymen. Write to the Society for information about membership. Gray Iron Founders' Society, Inc., Dept. F, National City-E. 6th Bldg., Cleveland 14, Ohio.

modern
Make it better with Gray Iron

GRAY IRON FOUNDERS' SOCIETY

Circle 682 on Inquiry Card—Page 219

Here's what Industry has to say about REDA melting Furnaces . . .

nothing but praise for the REDA FURNACE . . .

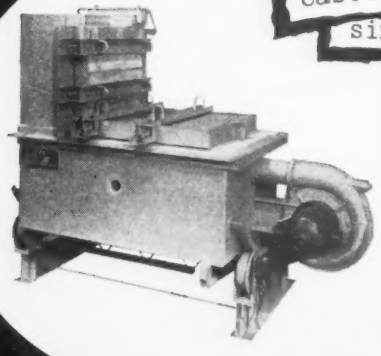
has improved overall foundry operation . . .

doing a wonderful job . . .

much more flexible . . . entirely satisfactory .

castings come cleaner . . .

sincerely recommend it . .



Reda Stack-Loading melting furnaces for ferrous and nonferrous metals have been designed and built by experienced foundrymen for foundrymen everywhere. That is why Reda furnaces provide advantages far beyond those found in other, and more expensive types; that is why, with Reda furnaces there is less down time for maintenance, longer uninterrupted melting runs, and lower melting costs.

Another feature is the Reda Burner arrangement which can operate from oil and gas simultaneously or be switched from one fuel to the other instantly. *Write or phone for complete details.*

REDA FURNACE

REDA PUMP COMPANY • BARTLESVILLE, OKLA.

Circle 683 on Inquiry Card—Page 219

GOT MELTING PROBLEMS?

Solutions to foundry problems often come easier to outside consultants. Get expert help; call for a Semet-Solvay metallurgist . . . he's a practical foundryman whose job it is to help you.

SEMET-SOLVAY DIVISION

ALLIED CHEMICAL & DYE CORPORATION

40 Rector Street Allied Chemical *New York 6, N. Y.*

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For Better Melting

Circle 684 on Inquiry Card—Page 219

terials, coupled with higher wage rates granted foundry workers last spring, make higher casting prices inevitable.

New York— Business in gray iron castings is proceeding at a good clip. Producers generally are operating five days a week, although backlogs vary. Foundries turning out heavy castings report backlogs of eight to ten weeks; those doing light squeezer work report two to three weeks. Those specializing in machine tool requirements are particularly active, with some operating five and a half days a week. Shortage of skilled help for these larger jobs is apparent.

Scarcity of molders also is reported by producers of nonferrous castings. Captive shops report difficulty along these lines and many of the job shops also are complaining. All of this points to an over-all good demand.

Shipyard requirements are stepping up. Producers of industrial valves and pumps and meters are operating fully and certain captive shops are beginning to sublet business.

Aluminum foundries are operating principally on miscellaneous commercial work. Government business for most of them is way down since a year or so ago. Most nonferrous shops have not too much in the way of backlogs, but this is more or less normal. They seldom do, at least in this area.

Hold Conference To Discuss Indirect Labor Measurement

The University of Kansas Extension Center and the Kansas City Chapter of the Society for the Advancement of Management will present the fourth annual Heart of America Industrial Engineering Conference November 16 at the university's Medical Center Continuation Study Building in Kansas City, Kans.

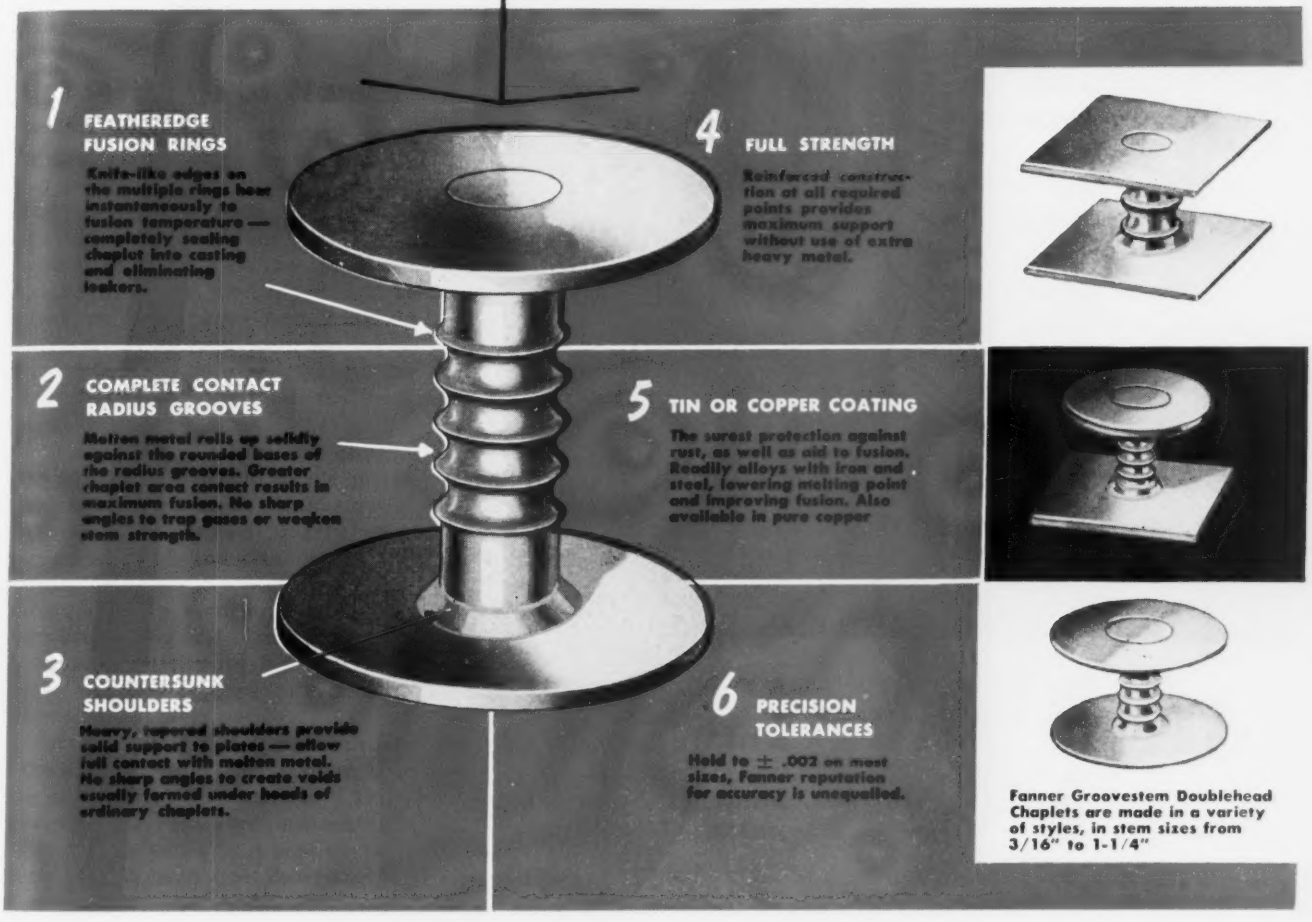
The conference theme is "Measurement of Indirect Labor in Industry." Leaders in industrial engineering will discuss work measurement in plant maintenance, warehousing and material handling and in the office and clerical activity. In the evening they will serve as a panel to discuss questions submitted during the afternoon sessions.

Advance registration can be made by writing N. Webster Rickhoff, manager, University of Kansas Extension Center, 39th St. & Rainbow Blvd., Kansas City.

get maximum fusion and solid core support

with fine FANNER

DOUBLE HEAD GROOVESTEM CHAPLETS


1 FEATHEREDGE FUSION RINGS
Knife-like edges on the multiple rings heat instantaneously to fusion temperature — completely sealing chaplet into casting and eliminating leakers.
2 COMPLETE CONTACT RADIUS GROOVES
Molten metal rolls up solidly against the rounded bases of the radius grooves. Greater chaplet area contact results in maximum fusion. No sharp angles to trap gases or weaken stem strength.
3 COUNTERSUNK SHOULDERS
Heavy, tapered shoulders provide solid support to plates — allow full contact with molten metal. No sharp angles to create voids usually formed under heads of ordinary chaplets.
4 FULL STRENGTH
Reinforced construction at all required points provides maximum support without use of extra heavy metal.
5 TIN OR COPPER COATING
The surest protection against rust, as well as aid to fusion. Readily alloys with iron and steel, lowering melting point and improving fusion. Also available in pure copper
6 PRECISION TOLERANCES
Held to ± .002 on most sizes, Fanner reputation for accuracy is unequalled.

Fanner Groovestem Doublehead Chaplets are made in a variety of styles, in stem sizes from 3/16" to 1-1/4"

■ Have you checked into the exclusive features of fine Fanner Double Head Groovestem Chaplets? Foundries everywhere have found that this design makes a tremendous improvement in the production of higher quality castings through solid core support . . . complete fusion . . . freedom from leakers and accurate wall thicknesses! Firms doing critical casting work standardize on Fanner Groovestem Chaplets because of the superiority proven in their own production. Get complete information by writing for samples and prices now!

Engineering Service

Qualified and specialized engineers in FANNER's Technical Service Division are available for consultation, without obligation, on problems of producing more intricate castings; developing increased strength, closer tolerances, and better quality; reducing machining and improving finish — both in ferrous and non-ferrous castings. Take advantage of the research and development work that FANNER has invested in this field to improve your profit picture. Simply direct your request to the address shown below.

THE FANNER MANUFACTURING CO.

BROOKSIDE PARK CLEVELAND 9, OHIO

Designers and Manufacturers of Fine Fanner Chaplets and Chills

Hats Off to

SMITH L-O CORE OIL

Foundrymen everywhere "doff their hats" to Smith L-O because here is a core oil that means *smooth going!* And that is a statement of fact. Smooth going with Smith L-O comes from the *controlled uniformity* of the grade core oil that is best suited to your operation. And that grade you require means a lot, too, and its use is based on the recommendation of the qualified Smith Practical Foundry Serviceman in your area. Call him in when you want assistance . . . it is his business to study your requirements and it's a habit of his to come up with the right recommendation. Yes . . . hat's off to Smith L-O —the name that stands for a service as well as a product.

SMITH REPRESENTATIVES

- ALGONQUIN CHEMICAL CO., INC. Hamburg, Pennsylvania
- FOUNDRIES MATERIALS CO. Coldwater, Michigan
- FOUNDRY SERVICE CO. Birmingham, Alabama
- F. F. SHORTSLEEVE Elmira, New York
- PACIFIC GRAPHITE CO., INC. Los Angeles 22, California
- ST. LOUIS COKE & FOUNDRY SUPPLY CO. St. Louis, Missouri
- BRUCE-CONREAUX CO. INC. Indianapolis 7, Indiana
- WESTERN INDUSTRIAL SUPPLY CO. Portland 14, Oregon
- MALCOLM G. STEVENS Arlington, Massachusetts

Smith L-O Core Oil

ROD DIP LIQUID PARTING

SMITH OIL & REFINING CO.

INDUSTRIAL OILS DIVISION • ROCKFORD, ILLINOIS

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Meditations of a Sandman

By HAROLD E. HENDERSON
H. C. Macaulay Foundry Co.
Berkeley, Calif.

"Importance of Names"

A NEWSPAPER reporter learns early in his career that names are important in most of his copy. The bigger the name, the greater the importance of any news connected with it. If the President coughs in public, the cough will be noted on front pages from coast to coast, whereas if an unknown laborer murders his wife and family, the story may be buried on the back pages of the big dailies.

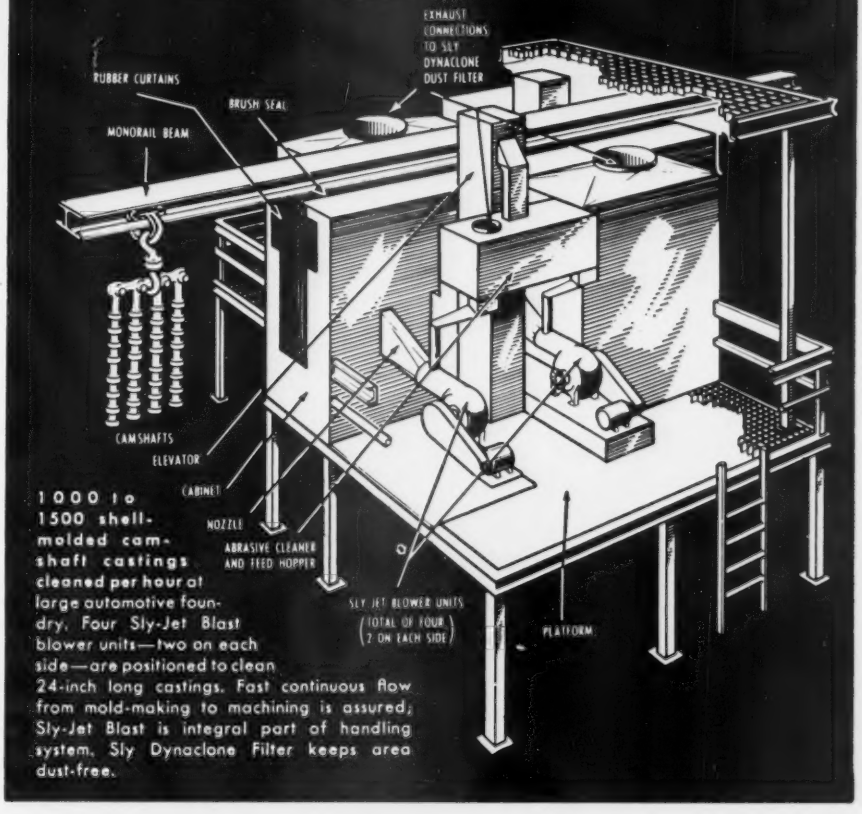
To some extent this matter of relative importance in the public prints applies to foundrymen. Unlike newspapers, which depend largely upon the sensational, the criminal or the tragic element to hold reader interest, foundry reporters, publishers, laboratory men and consultants confine their activity to less dramatic work, which they hope to reduce to scientific exactness.

The very nature of their work removes them from the glamor and glare of morbid publicity. Their achievements, however momentous, seldom are greeted by a popular fanfare. These men are deserving of a recognition and gratitude few of them ever receive. They hear little of the world's applause and seemingly are content with their anonymity. They have labored faithfully to bring the benefits of science to the foundry—this basic industry. Theirs certainly has been no easy path, and the ground they have tilled often has appeared unyielding. Yet the fruits of their labor today are enjoyed by foundrymen and the public the world over, most of whom haven't the remotest idea how, when or by whom these benefits were bestowed.

Your old sandman certainly is not qualified to list or to evaluate individual achievements in foundry practice during the last 50 years, even though he has spent most of that period in a foundry. (A fly is too close to the map to see the surface he's crawling over.)

Probably most of us are inclined

NEW LOW-COST WAY TO CLEAN SHELL-MOLDED CASTINGS



1000 to 1500 shell-molded camshaft castings cleaned per hour at large automotive foundry. Four Sly-Jet Blast blower units—two on each side—are positioned to clean 24-inch long castings. Fast continuous flow from mold-making to machining is assured; Sly-Jet Blast is integral part of handling system. Sly Dynaclone Filter keeps area dust-free.

NEW SLY-JET BLAST

Eliminates need for air compressor . . .
Eliminates maintenance costs of airless wheels

Now, clean shell-molded castings faster, at lower cost. With new, *low-velocity* Sly-Jet Blast, cleaning action is thorough yet "gentle"— therefore, no pitting, no removal of parent metal, no warping or distortion as with other cleaning methods. *Efficient*—abrasive is accurately directed over a large work area through a stationary nozzle, which can be set at any angle from horizontal to vertical. *Economical operation*—blower unit is powered by electric motor; there is no compressor, no need for high horsepower. *Long, trouble-free operation*—there are no moving parts in the blast zone; abrasive is introduced directly into the nozzle. *Versatile*—nozzle opening can be in any shape from circular to rectangular and any size. Abrasive can be any grade of sand, most grades of grit. *Non-stop operation*—cleaning mechanisms can run continuously for effective integration in continuous-flow handling systems.

Take the problem and expense out of cleaning shell-molded castings. Write today for the facts on new Sly-Jet Blast.

SINCE 1874 SLY

THE W. W. SLY MANUFACTURING CO.

4753 TRAIN AVENUE • CLEVELAND 1, OHIO

OFFICES IN PRINCIPAL CITIES

Circle 687 on Inquiry Card—Page 219

WHEELABRATOR®
STEEL SHOT

cuts abrasive costs
up to 23%
for Crucible Steel Castings Co.

Wheelabrator Steel Shot proved most economical cleaning steel castings at Crucible Steel Castings Co.! Tests made in a 3-wheel Wheelabrator Monorail Cabinet showed these results: In 322 hours, the 3 wheels consumed over 19,000 lbs. of malleable abrasive, for an abrasive cost averaging $1.578 per wheel hour for each wheel. In 202 hours, the machine used approximately 6,800 lbs. of Wheelabrator Steel Shot for an average abrasive cost of $1.215 per hour for each wheel. This means savings of $.363 per hour for each wheel. The Milwaukee steel foundry operates 10 wheels a total of 100 hours each day, so daily abrasive cost savings add up to approximately $36.30 — or about $8,000 annually. You, too, can save with Wheelabrator Steel Shot, the low-cost answer to cleaning problems.

For additional information on Wheelabrator Steel Shot, send today for Bulletin 89-C.

WHEELABRATOR
CORPORATION
505 S. Byrkit Street, Mishawaka, Indiana

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to be unimpressed by the many innovations that gradually have changed the foundry industry. Skipping lightly over the pages of this half-century, we see the advent of oil-bonded sand, synthetic (formulated) molding sand, a variety of ingenious molding, core making and blasting machines, continuous ovens, automatic sand handling and conditioning equipment, scientifically controlled binders, metal and melting improvements, centrifugal casting, die and permanent mold castings, shell molds and cores, the CO_2 process and many other achievements which most of us know little about, although all of us benefit directly because of them.

Let's momentarily consider synthetic molding sand. (Frank Brewster calls it "formulated.") Although it has by no means solved all our sand problems, it has proved a long step in that direction and has exposed new horizons of casting possibilities. If facts and figures were available, it would be interesting to compare the practice and results in shops where this change in sand practice has been effected. What increases have been gained in hourly production and in improved finish and soundness and what decreases in casting loss, finishing and cleaning time?

If the story could be recorded accurately, it undoubtedly would prove a revealing tribute to that long list of men, known and unknown, who by their genius and devotion made it all possible.

Progress is no accident. It is a human achievement and deserves to be so regarded. We revere the memory of such men as Richard Moldenke, John Penton, Bob Kennedy and Heinrich Ries, for they provided the pioneering example that since has

"Say, Boss, I wantcha to take a look at this here. . ."

DO YOU KNOW?

The ONLY complete line of

ADJUSTABLE

and

SELF ALIGNING

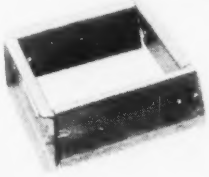
Slip Jackets

is manufactured by

Products Engineering Co.

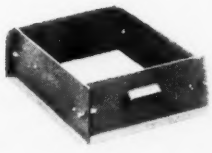
Cape Girardeau, Mo.

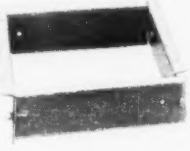
Pats. Pend.



Type I
3/16" Steel
"Eliminate Shifts"

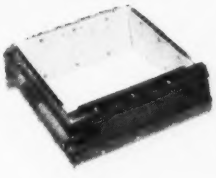
Type II
¼" Steel
"Reduce Crushes"





Type III
¼" Steel
"Fewer Run-outs"

Type IV
10 Gauge Steel
¼" Transite
"Less Maintenance"



Type V
3/16" Steel
½" Transite
"Lower Costs"

- The only jacket which is adjustable to fit different size molds—just drill more holes for more sizes.
- The jacket is self-aligning with controlled flexibility.
- All sides are replaceable and can be interchanged with others.
- Transite liners are easily replaced with stove bolts.
- Metal catching lugs have been eliminated so the jacket operates longer. Maintenance is easy as this is the only flexible jacket whose sides will lie flat.

For additional information write—

Products Engineering Co.

Cape Girardeau, Mo.

Name _____

Company _____

Address _____

City-Zone-State _____

Circle 689 on Inquiry Card—Page 219

inspired us. They insisted on finding *the better way,* and they instilled this insistence into the younger men who have carried on after them.

We all have heard of the boastful, self-made man who, in his own estimation at least, is an unqualified success. His inspiration has come strictly from within. He scorns the very idea of having ever received assistance from another, either in conversation or through the printed word. He emanates the spirit of a prophet, heaven-sent to guide his confused associates. This man must enjoy an exalted state of perpetual intoxication!

During the last 46 years, I have watched many boys, each learning his part of the foundry trade. Some read every technical article they could lay their hands on. Others, not given to reading, seemed never to tire of asking questions concerning the techniques of foundry practice. And then, of course, there were those who neither read nor talked about the work they were doing, but seemed to learn entirely by listening and doing. These men seemed to absorb knowledge by a sense of touch. However, even the silent, nonreader still was getting the benefit of the printed word from those who did read and could communicate the message.

Original Thoughts Are Rare

If I were completely honest (which is highly questionable), I would have to admit that I probably never have had an *original thought* in my entire life. Someone else handed me the words and ideas that I have found useful, and I simply have mulled and aerated them for my immediate need.

When any sand mix of mine completely fulfills its intended purpose—when it produces castings that are a joy to behold and excite admiring comment—my chest expands, and I become inordinately proud of myself. But my sense of glory usually is of short duration, for invariably the old troubles return to remind me of my fallibility. It's then that I must reread the thoughts of my predecessors, whose wisdom and patience anticipated my difficulties and whose guidance has proved rewarding.

I wish it were possible for me to acknowledge adequately my indebtedness to all who have directed my faltering steps along this sandy road, but such a task is quite beyond me. The mention of names might prove embarrassing to certain sensitive natures, and I would be sure to overlook some who were equally deserving and might justly feel hurt at the omission. On the other hand, my questionable reputation in sand prac-

STEELETTS®

MAKE THE DIFFERENCE

STEELETTS IMPROVE APPEARANCE, CUT COSTS IN NON-FERROUS FINISHING FOR THESE REASONS:

UNIFORM ETCHING
Steeletts resistance to breakdown provides a more uniform etch.

LONGER LIFE
Steeletts are a high-carbon electric furnace steel grit, especially-heat treated to remain full size far longer.

REDUCED ABRASIVE CONSUMPTION
Due to their breakdown resistance, Steeletts remain effective through many more blast cycles.

FAST CLEANING
Because of Steeletts hardness, they give faster cleaning and permit quick, easy etching of all surfaces.

LESS EQUIPMENT MAINTENANCE
Steeletts eliminate sharp fracture edges, reduce wear and maintenance of blades and liners.

FOR COMPLETE INFORMATION ON STEELETTS, WRITE TODAY FOR BULLETIN No. 901-D.

WHEELABRATOR
CORPORATION

505 South Byrkit St., Mishawaka, Ind.

Circle 690 on Inquiry Card—Page 219

"This Scale Check Chart showed us how to get Better Cost Control"

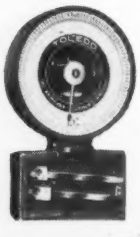
It's New from TOLEDO— send for yours today!

Your scales are a vital element in effective cost and quality control. Errors in weighing go all the way through accounting and affect cost . . . profit . . . or loss! You need to look at *all* your weighing today . . . not as isolated scales, but as a *weighing system.*

Toledo's new Scale Check Chart will show you quickly and accurately how well your scales are serving you, and provide the information you need for truly effective cost control.

This new Check Chart is yours for the asking in a handy kit that contains all you need for an easy, informative appraisal of weighing in your plant. Send for it today. Address Toledo Scale Company, 1408 Telegraph Rd., Toledo 1, Ohio.

On Your Scales . . . Material Becomes Money!



TOLEDO®
HEADQUARTERS FOR SCALES

Circle 691 on Inquiry Card—Page 219

tice might provoke many to bribe me not to mention their names at all.

I say this, remembering an incident that occurred about 1943. Attending a San Francisco meeting at which Norman Dunbeck was guest of honor, I requested advice on a special sand mix for a job we were having trouble with. Norman was most obliging in spelling out what he believed was the mix I needed. He then wanted to know when I intended to try it out?

I told him that we would use it on the following day. He studied for a moment, then asked if I would just as soon put it off for a couple of days? I said, "Okay, but why?" He replied, "well, I expect to be out of town by that time!" Subsequent experience has taught me the wisdom of his apprehension. However, Norman need not have worried. The mix was completely satisfactory, and we still use it.

In this pursuit of sand knowledge, my benefactors have been many, of both high and low degree in the academic scale. I feel that I have learned something, from both the boys who have earned their sheepskins and those whose knowledge was acquired on the molding floor.

Summarizes High-Temperature Properties of Copper Alloys

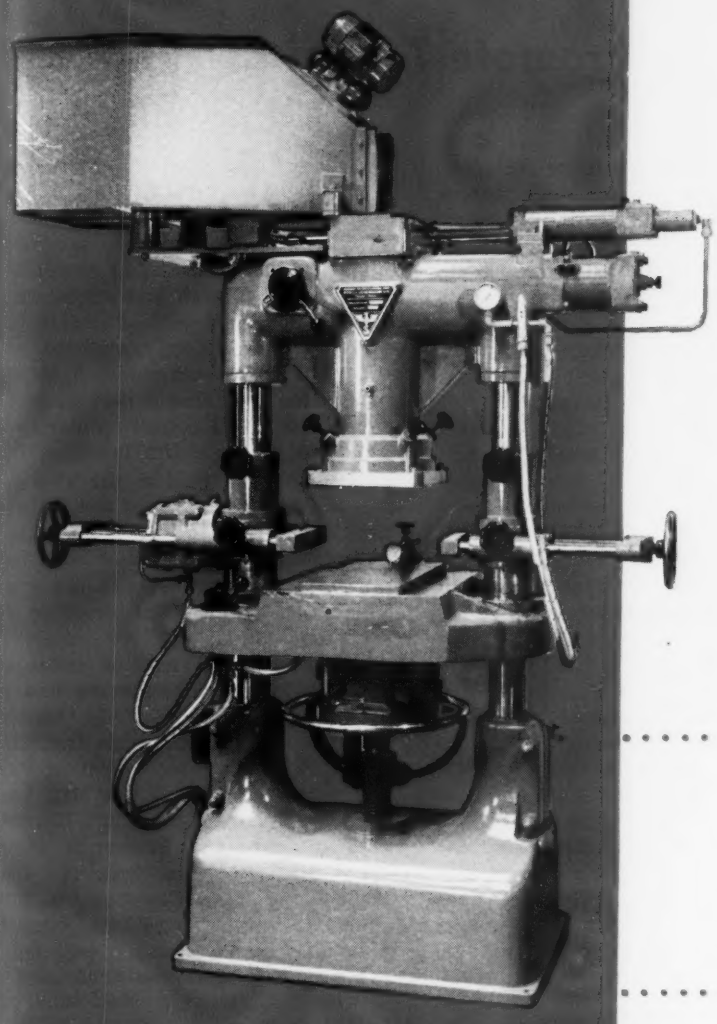
"Elevated - Temperature Properties of Coppers and Copper-Base Alloys" is Special Technical Publication No. 181 of the American Society for Testing Materials. It is the latest in a series of reports on the effect of temperature on the properties of metals, prepared under auspices of the Data and Publications Panel of ASTM and the American Society of Mechanical Engineers.

Primarily a graphical summary of the elevated-temperature data for coppers and copper-base alloys, it includes data on modulus of elasticity; tensile strength; yield strength (0.5 per cent extension and 0.2 per cent offset); reduction of area; elongation; stress for creep rates of 0.000001, 0.00001 and 0.0001 per cent per hour; and stresses for rupture in 100, 1000, 10,000 and 100,000 hours. Data for coppers are limited to wrought materials, and the data for the alloys apply to both cast and wrought materials.

The publication contains 248, 8½ x 11-in. pages with a heavy paper cover. It was prepared for the panel by Clair Upthegrove and Henry L. Burghoff. Copies are available from ASTM headquarters, 1916 Race St., Philadelphia 3, at $5.50 each.

V+S Core Shooter

...for fast, economical production of cores



The V+S Core Shooter is available in 4 sizes of varying capacities. Shoot Heads can be furnished to accommodate all core boxes.

- The V + S Core Shooter is as revolutionary as the first core blower. It offers an entirely new core making technique.
- Extremely high green strength "stand up" cores can be made with any binder —oil, resin, or STEINEX*. This amazing machine will even shoot molding sand.
- Wooden core boxes can be used as successfully as metal boxes. Very little air used.
- Economical for mass production and short runs as well. Core boxes can be changed readily.
- Extremely simple—no motors, relays, wires, no bearings, shafts or plows to contend with—assuring fewer shutdowns and less maintenance cost.

Try This Kleenex Tissue Test

Place half a KLEENEX tissue in the core box and shoot it in the V + S Core Shooter. The Kleenex will not be damaged. A regular core blower will tear it to bits.

Ideal for CO_2 Process with STEINEX because hardening in shoot holes and shoot heads is eliminated.

***STEINEX** is a remarkable core sand binder. Cores and shell molds, made of core sand mixed with STEINEX can be hardened in a few seconds by the injection of carbon dioxide — and used immediately

Phone or Write for Full Information and Literature

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CARVER FOUNDRY PRODUCTS CO.

1060 HERSHEY AVENUE, AMHERST 3-1845, MUSCATINE, IOWA

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Board Chairman

MALLEABLE FOUNDATION FORMED

To Promote Technical Progress

THE MALLEABLE Research & Development Foundation, a new organization to promote technical progress in the foundry industry, has been incorporated by five leading malleable casting foundries.

Organizers of the Foundation are the Albion Malleable Iron Co., Albion, Mich.; Auto Specialties Mfg. Co., St. Joseph, Mich.; Dayton Malleable Iron Co., Dayton, O.; National Malleable & Steel Castings Co., Cleveland, and Wagner Malleable Iron Co., Decatur, Ill. These companies are independent high-production foundries in the malleable casting industry.

This new organization will be concerned with the technical not the marketing phases of its industry. Essentially it will seek to develop methods of making better castings at a lower cost. Its main objectives are 1) to promote the general welfare of the malleable castings industry through scientific and industrial research and 2) to assist in the discovery and development of new products, better processes and improved equipment for production foundries.

In accomplishing its objectives, the Foundation will co-operate with all other branches of the foundry industry and with the various organizations serving foundries. It will participate, however, only in activities which are exclusively related to research and development.

In its work, the Foundation will utilize the laboratories of commercial research organizations, engineering schools, member companies and equipment manufacturers. Each project will be studied carefully to determine the best place to have the work undertaken.

In addition to contributing financially to the Foundation, each member will supply technical knowledge and practical know-how to the research projects. Participating members will furnish whatever technical knowledge they already may possess on the particular subject being studied. Members who participate in any research project will share equally in the results of the work.

Membership in the Foundation is open to other malleable foundries. To qualify, a company must sell at least 60 per cent of its production of malleable castings to other than affiliated concerns. In addition, it must operate a malleable iron foundry equipped with power-driven mold conveyors, and mold and pour continuously for eight hours or more. It also must have a reasonably well equipped and adequately staffed research department devoting substantial time to research and development.

Organizers of the Foundation believe that it can contribute much to the malleable castings industry. Fruits of its research in the way of new methods, processes and products will be made available to the entire malleable industry on a reasonable basis. To whatever degree the work of the Foundation is successful, the buyers of malleable castings will benefit through improvement in casting quality and also in lower cost.

In the past, captive malleable foundries with large research facilities have been extremely generous in co-operating with other foundries. Benefits of research and engineering have been shared with others in the industry. By pooling knowledge, expenses, facilities and research effort, Foundation members expect developments which will permit similar contributions to the entire industry.

Founding members of the Foundation are also members of the Malleable Founders' Society and other foundry organizations, the activities of which neither duplicate nor conflict with the proposed program of the Foundation.

The Foundation will be managed by a board of trustees comprised of the following: Collins L. Carter, president, Albion Malleable Iron Co.; Waldo V. Tiscornia, executive vice president, Auto Specialties Mfg. Co.; Anthony Haswell, president, Dayton Malleable Iron Co.; Wilson M. Moriarty, first vice president, National Malleable & Steel Castings Co., and John A. Wagner, president, Wagner Malleable Iron Co.

Mr. Moriarty is chairman of the

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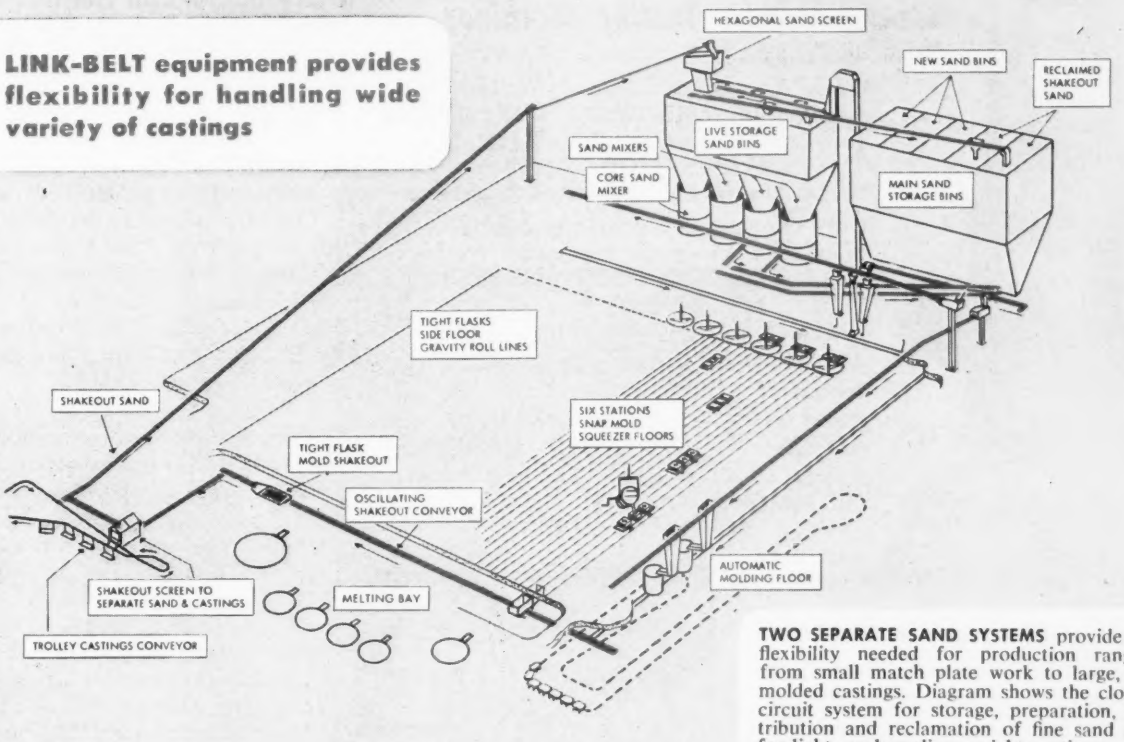
General Metals jobbing foundry approaches

full mechanization

LINK-BELT equipment provides flexibility for handling wide variety of castings

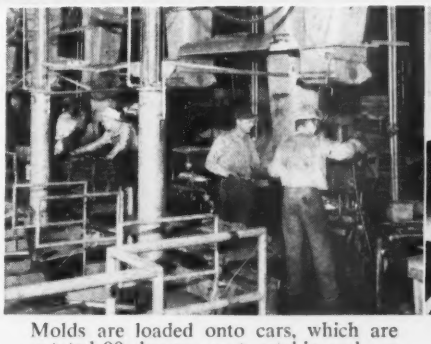


LINK-BELT

TWO SEPARATE SAND SYSTEMS provide the flexibility needed for production ranging from small match plate work to large, pit-molded castings. Diagram shows the closed-circuit system for storage, preparation, distribution and reclamation of fine sand and for light- and medium-weight castings.

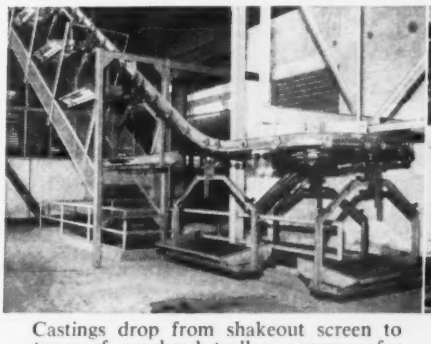
THE variety of castings produced by job shops multiplies handling problems. But the Oakland (Calif.) plant of General Metals Corp. proves that mechanization is both possible and practical. Here Link-Belt equipment—including special machinery designed specifically for this installation—speeds production of castings ranging from one pound to seven tons. Other benefits include minimized manual handling, improved working conditions.

Link-Belt engineers can plan an entire conveying and sand preparation system for you . . . and follow through with a complete line of equipment to help you produce better castings at lower cost. For one machine or complete engineering, call your nearest Link-Belt office. For complete information, write for Book 2423. 14,207



Molds are loaded onto cars, which are rotated 90 degrees on turntable and run off on tracks to pouring and storage line.

Semi-automatic device dumps sand and castings onto oscillating conveyor. Cars return by gravity to molding stations.



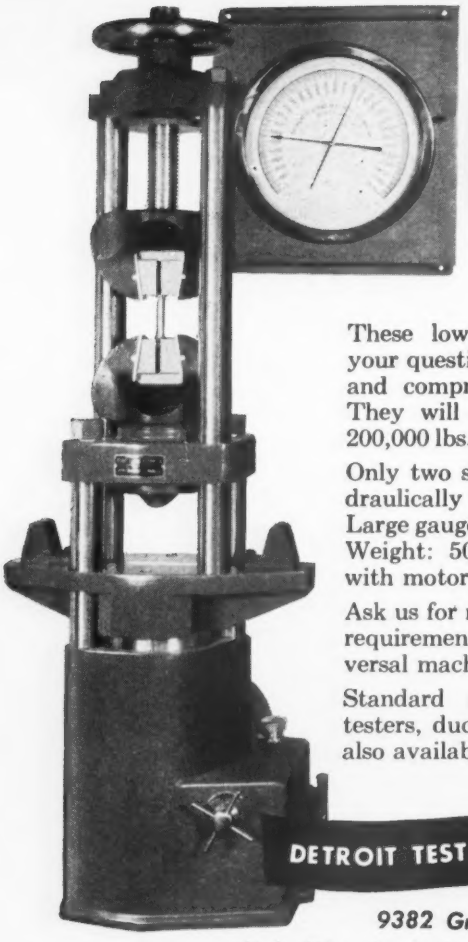
Castings drop from shakeout screen to trays of overhead trolley conveyor for delivery to cleaning bay.

Unique Link-Belt "Manipulator" carries up to eight tons of castings to annealing ovens, quench tanks or storage.

LINK-BELT

CONVEYORS AND PREPARATION MACHINERY

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.



30,000 and 40,000 pound

Universal

Testing Machines

These low-cost machines will answer all your questions about the tensile, transverse, and compression strength of metal parts. They will apply up to the equivalent of 200,000 lbs. per sq. inch (on a .505 specimen).

Only two simple controls operate these hydraulically powered, automatic machines. Large gauge gives accurate reading instantly. Weight: 500 lbs., height: 4′-4″. Equipped with motor, gauge, grips, and blocks.

Ask us for more information or send us your requirements for a quotation, as this Universal machine can be modified many ways.

Standard and special Brinnel hardness testers, ductility testers, and tensile testers also available.

DETROIT TESTING MACHINE COMPANY

9382 Grinnell Avenue, Detroit 13, Michigan

Circle 694 on Inquiry Card—Page 219

★ ★ ★ This is where PATTERNS of quality and precision are produced for the automotive, aircraft and metalworking fields . . . backed by 35 years of know-how.

★ ★ ★ These superior PATTERNS are produced under the personal supervision of the two owners and a highly skilled group of employees.

★ ★ ★ The owners are naturally proud of their reputations. That's your guarantee of quality work and reasonable prices. Let them give you a quotation on your next job—and give you a pleasant surprise.

AUTOMOTIVE PATTERN *Company*

Wood and Metal Patterns

18840 John R. St., Detroit, Michigan

Circle 695 on Inquiry Card—Page 219

board and Mr. Haswell is vice chairman. Officers, to be elected later, will include a president who will be the technical director and full-time executive officer.

Schedule Metal Finishing Show For Cleveland Oct. 30-Nov. 2

More than 35 manufacturers of machine tools which grind and polish with coated abrasives will exhibit their newest developments to the metalworking industry at a Metal Finishing Show to be held Oct. 30 through Nov. 2 in Cleveland. The working exhibit will be sponsored by Behr-Manning Co., Troy, N. Y., a division of Norton Co., and will take place at its Cleveland branch at 4101 West 150th St.

Visitors are encouraged to submit "problem children" components and products to actual grinding and polishing tests on virtually every coated abrasive machine tool developed in this country during the last two years. Exhibits will be staffed by technical representatives of the machine manufacturers and by abrasives specialists of Behr-Manning.

Machines to be demonstrated—many for the first time—will range from heavy automatic and semiautomatic grinders to highly specialized belt machines. In capacity they will cover the whole field of metalworking.

Several times daily, 30-minute classes will be conducted to show users when to specify aluminum oxide or silicon carbide abrasives; compare performance of cloth and paper belts; discuss belt speeds, grit sizes, coolants and lubricants; and demonstrate on steels, nonferrous metals and alloys. In addition, a new color motion picture on metalworking will have its first showing.

"When I say drop it, I mean gently of course!"

FOUNDRY RESEARCH

includes Lectromelt* Furnaces when building for the future

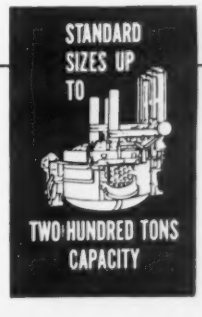
RECOGNIZING the importance of the electric arc furnace to the modern iron and steel foundry, research laboratories now include them for help in developing methods and solving metal problems. The two Lectromelt Furnaces shown above are in such a foundry—small enough to expedite experiments, big enough to simulate production runs.

Lectromelt Furnaces give the exact control of heat and analyses needed to make today's engineered castings. With metallurgical research finding more and more uses for special alloy castings, specifications are tougher, yet a good foundry with a Lectromelt Furnace can meet these rigid requirements.

Our engineers will answer your questions covering all sizes of furnaces. Catalog No. 9-A describes them. For a copy, write Lectromelt Furnace Company, 314 32nd Street, Pittsburgh 30, Pennsylvania (a McGraw Electric Company Division).

Manufactured in . . . ENGLAND: Birlec, Ltd., Birmingham . . . FRANCE: Stein et Roubaix, Paris . . . BELGIUM: S. A. Belge Stein et Roubaix, Bressoux-Liege . . . SPAIN: General Electrica Espanola, Bilbao . . . ITALY: Forni Stein, Genoa . . . JAPAN: Daido Steel Co., Ltd., Nagova

*REG. T. M. U. S. PAT. OFF



WHEN YOU MELT... Lectromelt

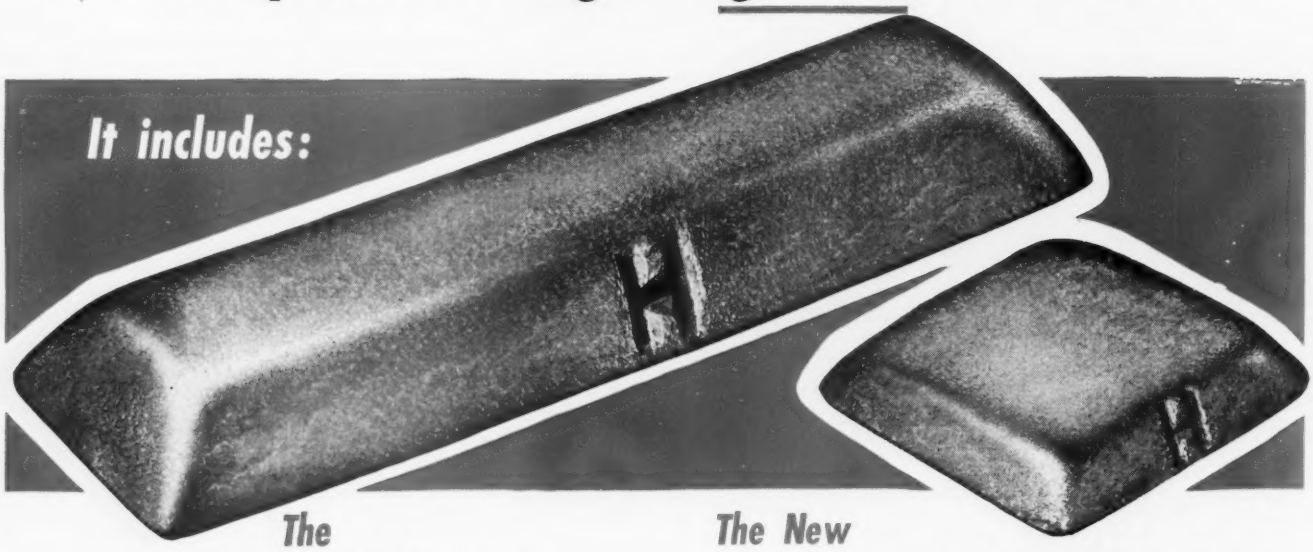
Now, more than ever, you can depend on

HANNA

as your best source for

PIG IRON

- *Our merchant capacity is bigger than ever*
- *Our plant is better than ever*
- *Our product range is greater than ever*



The

HANNA 38-POUND PIG

The foundryman's favorite standard pig. Available in all grades, silvery and HannaTite. A good example of the quality that has made Hanna "the best known name in iron."

The New

EXCLUSIVE HANNATEN INGOT

For 10-lb.-pig users, this new ingot means no free-carbon pockets, finer grain structure, more even melting. Available in all grades, silvery and HannaTite—an extra-close-grain iron.

THE HANNA FURNACE CORPORATION

Buffalo • Detroit • New York • Philadelphia

Merchant Pig Iron Division of

NATIONAL STEEL CORPORATION

Circle 697 on Inquiry Card—Page 219

Obituary

HARRY O. BURROWS, 64, consultant, Aluminum Co. of America, Cleveland, died Sept. 10. A graduate of Hiram College, he was superintendent of Alcoa's ingot plant from 1923 to 1934, when he became plant manager. For the past two years he was a consultant in problems affecting melting techniques of aluminum alloys in all of the Cleveland plants.

Henry A. Saller, recently named an assistant technical director, Battelle Institute, Columbus, O., died Aug. 14, in Pittsburgh where he was attending a conference of the Atomic Energy Commission. Mr. Saller, a specialist in nuclear metallurgy, joined Battelle in 1941.

John T. Ramsden, 97, for many years chief engineer, Tabor Mfg. Co., Philadelphia, died Aug. 25. He was first associated with William Sellers & Co., Philadelphia, joining the Tabor company when it was moved to Philadelphia in 1900.

Bruno E. Dost, 79, for 63 years engaged in the patternmaking industry, died Aug. 24 in Milwaukee. Mr. Dost at one time was secretary-treasurer, Progressive Pattern Works Inc., Waukesha, Wis.

Herbert R. Simonds, 82, chairman of the board, Simonds Worden White Co., Dayton, O., died July 6. Mr. Simonds had been president of the company until last year.

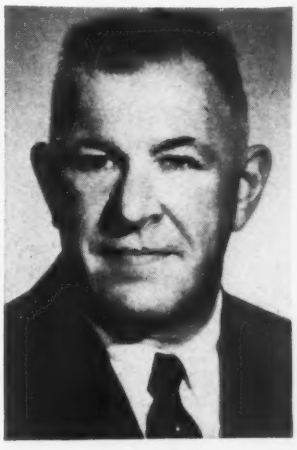
Abe Schwarz, 81, founder and president, Wisconsin Aluminum Foundry Co., Manitowoc, Wis., died Aug. 4. Mr. Schwarz founded the company in 1910.

Arthur J. Boyer, 67, sales representative, E. F. Houghton & Co., Philadelphia, died there Aug. 20. He was associated with the company since 1944.

Gottlieb Loesel, 56, co-owner, Albra Metal Foundry Co., Long Island City, N. Y., died July 16.

Martin A. Dooley, 67, vice president-secretary, Sterling Wheelbarrow Co., West Allis, Wis., died Aug. 20 in Paris, during a European vacation. A director of the company, he was associated with it for 33 years. Mr. Dooley was also a director of Lawran Foundry Co., West Allis.

M. J. Rice, 54, since 1948 vice president of the General Products Division, Whiting Corp., Harvey, Ill., died recently. Mr. Rice was graduated from Worcester Polytechnic Institute, and after about 4 years in the iron and steel industry, he joined Whiting Corp. in 1927 as a service



M. J. RICE

engineer. In successive years he served as manager of various divisions and as manager of planning and manager of transportation.

Arthur C. Jaenke, 70, former traffic manager and assistant sales manager, Superior Foundry Inc., Cleveland, died Sept. 4. He was associated with the company for 51 years.

William J. Bartels, 63, vice president-treasurer, Erie Malleable Iron Co., Erie, Pa., died July 25.

Rocco J. Accetta, 48, treasurer, Whitehead Brass Foundry Inc., Brooklyn, N. Y., died July 11.

Canadian Company Is Formed

Prenco Products Co. has been formed in Canada and located at Lakeshore Road, Clarkson, Ontario. Specializing in treatment of porosity in castings of all kinds, the company also will manufacture foundry supplies and equipment of various other types. Its initial products will be a metal-oxide type seal for casting impregnation and a CO_2 process binder. John M. Atwood is general manager.

SHAMVA the superior mullite refractory.

HIGHEST quality, pure alumina base.

ASSURED uniform thermal expansion. Excellent load capacity at high temperatures.

MINIMUM impurities — high fusion point and excellent resistance to heat shock.

VOLUME stable — calcined at 3250° F plus for maximum Mullite crystal development.

ALL these superior qualities result in lower operating costs.

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No. 101 Shamva Specialties
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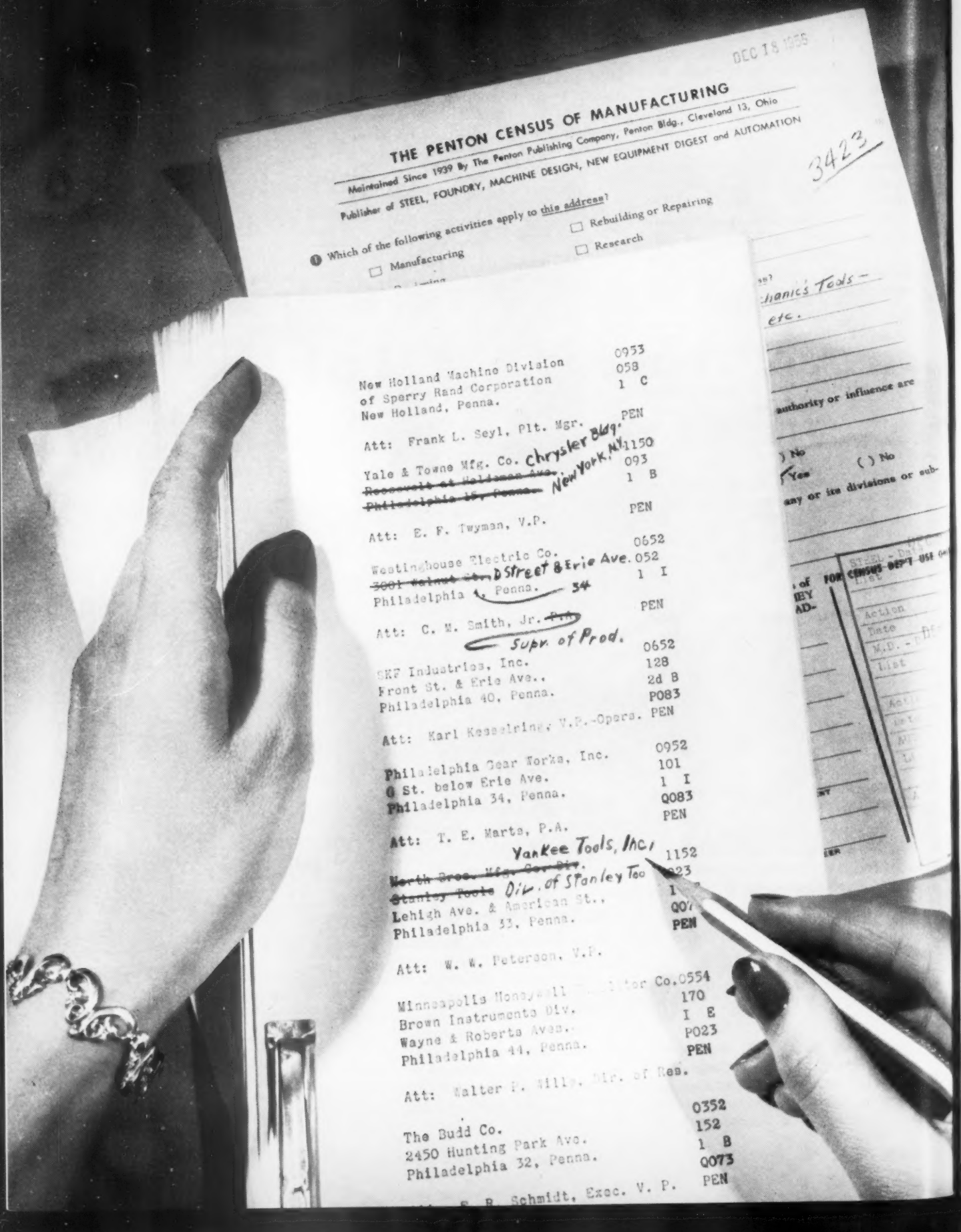
REPRESENTATIVES IN: Buffalo Chicago Cleveland Detroit Lancaster, Ohio New York Philadelphia Pittsburgh San Francisco Seattle Los Angeles Denver Tulsa In Canada: A. P. Green Fire Brick Co., Ltd. Main Office: Toronto

Circle 698 on Inquiry Card—Page 219

What's the basic benefit you gfr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Publisher of STEEL, FOUNDRY, MACHINE DESIGN, NEW EQUIPMENT DIGEST and AUTOMATION
DEC 18 1955
3423
1 Which of the following activities apply to this address?
Manufacturing
Rebuilding or Repairing
Research
etc.
authority or influence are
any or its divisions or sub-
New Holland Machine Division 0933
of Sperry Rand Corporation 058
New Holland, Penna. 1 C
Att: Frank L. Seyl, Plt. Mgr. PEN
Yale & Towne Mfg. Co. Chrysler Bldg. New York, N.Y. 1150
093
1 B
Att: E. F. Twyman, V.P. PEN
Westinghouse Electric Co. 0652
D Street & Erie Ave. 052
Philadelphia Penna. 34 1 I
Att: C. M. Smith, Jr. Supv. of Prod. PEN
SKF Industries, Inc. 0652
Front St. & Erie Ave.. 128
Philadelphia 40, Penna. 2d B
P083
Att: Karl Kesselring, V.P.-Opers. PEN
Philadelphia Gear Works, Inc. 0952
G St. below Erie Ave. 101
Philadelphia 34, Penna. 1 I
Q083
Att: T. E. Marts, P.A. PEN
Yankee Tools, Inc. 1152
Div. of Stanley Too
Lehigh Ave. & American St.,
Philadelphia 33, Penna.
Att: W. W. Peterson, V.P.
Minneapolis Honeywell 0554
Brown Instruments Div. 170
Wayne & Roberts Aves. I E
Philadelphia 44, Penna. P023
PEN
Att: Walter P. Willy, Dir. of Res.
The Budd Co. 0352
2450 Hunting Park Ave. 152
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PEN

g from Penton's million dollar census ?

Our million dollar investment in the Penton Continuing Census is paying *you* big dividends.

How? This is a *Continuing* Census. For 16 years it has been combing the market daily for new plants. It is continuously catching the changes—checking on personnel turnover, product diversification and plant expansion throughout this changing market.

All of this gathering of information doesn't help you one iota. It's the way we *use* it that counts.

You may assume your basic benefit from this million dollar census operation is the market research information you get—but that's *not* it. Important and helpful as such data is to so many of our advertisers—that's only a by-product of our census.

What is the basic benefit you get from Penton's Continuing Census? It is *constantly effective coverage* of your markets. We're using our up-to-the-minute census findings constantly to be sure we're reaching the right men in the right plants.

That's what you want. That's what you get from each Penton publication to make your advertising more effective.

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Publishing Company

PENTON BUILDING • CLEVELAND 13, OHIO

New Equipment and Supplies

Heat Treating Furnace

incorporates maximum working temperature of 2000°F

NRC Equipment Corp., subsidiary of National Research Corp., 160 Charlemont St., Newton Highlands 61, Mass.—Furnace for vacuum or controlled atmosphere heat treating has a resistance-heated uniform hot zone 36 in. in diam and 36 in. high. Maximum working temperature is 2000°F and minimum pressure 0.5 micron. The unit, introduced primarily to meet the demand for vacuum annealing titanium, is also useful for sintering, brazing, hardening and degassing. Vertical arrangement of heating element and vacuum bell makes it suited for production operations where product handling is mechanized.

For More Details Circle No. 401—Page 219

Insulation

will absorb hot or cold water yet develop no shrinkage

J. H. France Refractories Co., 1944 France Rd., Snow Shoe, Pa.—Plastic, waterproof, nonshrink insulation is intended for application where easier workability and tighter adherence is required than that offered by regular plastic insulations. It is recommended for use to 1800° F, dries white, has low thermal conductivity and is abrasion, vibration, impact and rust resistant. The material may be used around air ducts, boiler settings, boiler drums, burner casings, fittings of all types, gas generators, heat exchangers, hot air lines, hot water heaters, industrial furnaces and ovens, mains and flues, steam pumps and heaters, tanks and for other insulation applications.

For More Details Circle No. 402—Page 219

Portable Dust Collector

is designed for use with medium-sized grinding equipment

Hammond Machinery Builders Inc., 1605 Douglas Ave., Kalamazoo, Mich.—Portable dust collector is said to be ideal for capturing dust from medium-sized grinding equipment and to perform efficiently with drill presses, lathes, milling machines and surface grinders when these tools are used for high-speed machining of cast iron. Cabinet size is 22 in. deep x 25 in. wide x 28 in. high. Model 40 has a capacity of 700 cfm and can be used with two 16 x 2 in.

grinding wheels or two 4-in. abrasive belts. Four cyclone type units have capacities ranging from 500 to 2000 cfm.

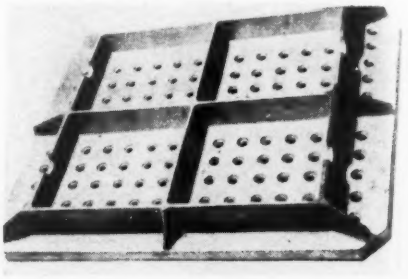
For More Details Circle No. 403—Page 219

Industrial Truck Batteries

are available in sizes to fit every motive-power need

Gould-National Batteries Inc., Stone and Calhoun Sts., Trenton 7, N. J.—Battery for electric industrial trucks is available in 40, 60 and 120 amp-hr positive plate capacities. The active battery material is regenerative oxide, which adds to plate life. Plate packs are wrapped in perforated plastic envelopes. Separators are microporous rubber, and retainers are spun glass 0.50 in. thick and highly porous. Element protectors and jars are hard rubber.

For More Details Circle No. 404—Page 219



Aluminum Bottom Boards

feature reinforced ribs for added strength and durability

Jo-El Co., 14209 Leroy Ave., Cleveland, O.—Bottom boards, made in over 80 sizes, are cast of aluminum with vent holes on face to permit gas escapement. They are said to eliminate burning, warping, repair, stacking problems, effects due to weather and to assure uniform molds each cast. Rib-reinforced construction provides strength and durability. Raised sand strip (optional) around outer edge peens each mold uniformly and eliminates sand slippage.

For More Details Circle No. 405—Page 219

Aluminum Oxide Brick

cuts metals contamination in reverberatory type furnaces

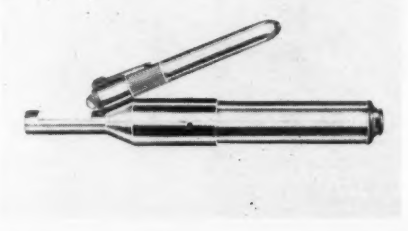
Electro Refractories & Abrasives Corp., 344 Delaware Ave., Buffalo 2, N. Y.—High-purity refractory brick reportedly virtually eliminates metal contamination in reverberatory furnaces. Brick is a 98 to 100 per cent pure aluminum oxide special refractory that is said to be easy to clean because it resists dross build-up.

For More Details Circle No. 406—Page 219

Brinell Microscope

provides accurate readings of deep brinell impressions

King Tester Corp., 440-44 North 13th St., Philadelphia 23, Pa.—Brinell microscope features maximum simplicity combined with accuracy in reading brinell impressions. Made



For More Details on These Items
Use Reply Card—Page 219

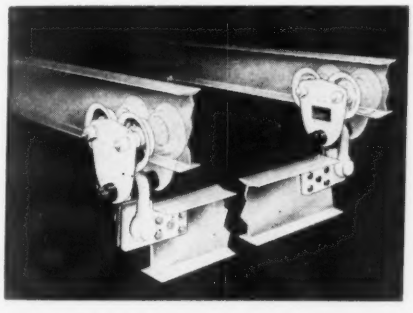
of stainless steel, it is compact, lightweight and strong. Lens has patented three-way construction and needs no adjustment to the eye. The microscope has a large opening in the side to utilize natural light and has built-in illumination for dark areas or to supplement natural light when necessary.

For More Details Circle No. 407—Page 219

Underhung Bridge Cranes

are claimed to be easily assembled from packaged kit

Shaw-Box Crane & Hoist Division, Manning, Maxwell & Moore Inc., Muskegon, Mich.—Kit permits assembly of a push type underhung bridge crane on locally purchased I-beam in less than two hours. Five holes drilled in each end of the I-beam permit bolting the two trolleys provided to the ends of the beam.



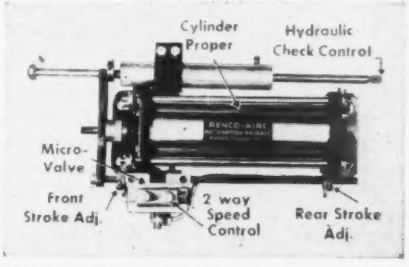
Each kit consists of two trolleys, two clevises with pins, two pairs of beam end plates and necessary spacing washers, bolts, nuts and lockwashers. Cranes will handle spans up to 25 ft and capacities up to 2000 lb. Wheels are adjustable to operate on American standard I-beams of from 6 to 12-in. size.

For More Details Circle No. 408—Page 219

Air Cylinder

incorporates built-in microaction directional valve

Renco-Toledo Inc., Dept. F-1, 3358 Alexis Rd., Toledo 13, O.—Automation package includes an air cylinder with microaction directional valve, adjustable two-way speed controls, a fully adjustable hydraulic check and is available in any desired stroke. Cylinder requires only a single air connection. Several air units may be mechanically interlocked to effect multiple machine cycles. Valve will operate at over



3000 cycles per min and the built-in stroke adjustment can be controlled to ±0.001 in.

For More Details Circle No. 409—Page 219

Stream Splitter

divides stream of dry material into several separate streams

Sprout-Waldron & Co., Muncy, Pa.—Stream splitter is designed to divide a single stream of dry, free-flowing material into two to eight separate, uniform streams. Material enters the top of the unit where it strikes an impeller rotating at approximately 300 rpm. The impeller agitates material into a continuous whirl which settles evenly in the various outlets. Leather brushes on lower end of drive shaft sweep material into outlets. The unit has a heavy gage steel housing with a dust-proof, clear plastic observation window. Machine is V-belt driven from a ¼ or ⅓-hp motor and has a safety relief clutch with shear pin.

For More Details Circle No. 410—Page 219

Modification Kits

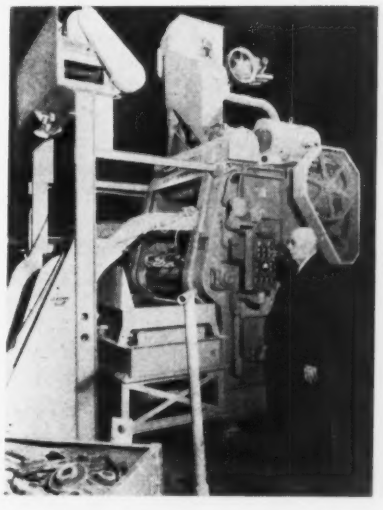
are for on-the-spot modification of magnetic starters

General Electric Co., General Purpose Control Dept., Schenectady 5, N. Y.—Six kits for on-the-spot modification of magnetic starters are available. Built for across-the-line nonreversing, combination or reversing starters, the six kits are designed so that modification can be made in a matter of minutes using only a screwdriver. The standard GE magnetic starter may be modified to fit any of six special conditions by installing a pushbutton or selector

Unit Applies Automation to Blast Cleaning

FOUNDRIES which must clean castings in large volume can make use of a fully automatic airless blast barrel that performs material handling, weighing, starting and stopping cycles automatically. Each phase can be controlled separately, if needed, by pushbuttons on a control board.

Operation begins with loading of skip by incoming conveyor. When load of a predetermined weight is in the skip, a switch automatically stops the feeding conveyor. When blasting cycle is completed and load discharged, the skip is automatically raised and dirty castings are received in the barrel. The skip returns to loading position and is filled with another load of dirty castings. Barrel door shuts, barrel rotates and Rotoblast wheel begins to throw abrasive. After a predetermined period, the wheel stops and castings are tumbled. Barrel stops, door opens, barrel reverses direction and cleaned castings are dumped out of the barrel onto another conveyor which takes the



castings for additional processing. Skip dumps in a new load and the cycle repeats.

This new unit, known as the Blastmaster Barrel, can be furnished in four sizes—6, 12, 18 and 27 cu ft. The equipment is made by the Pangborn Corp., 1400 Pangborn Blvd., Hagerstown, Md.

For More Details Circle No. 446—Page 219

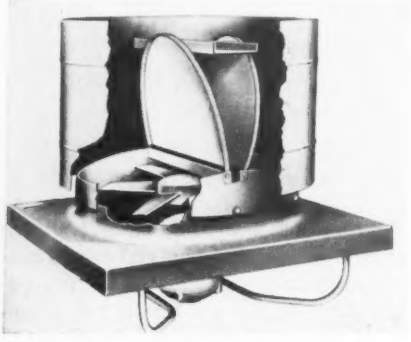
switch in the starter cover, changing fuse clips on the disconnect switch, changing the coil, adding a third overload relay or adding an auxiliary interlock kit.

For More Details Circle No. 411—Page 219

Roof Ventilators

feature airfoil blades welded to a specially designed hub

Detroit Blower Co., 9867 Pacific Ave., Franklin Park, Ill.—Industrial roof ventilators have airfoil fan blades welded to a specially designed hub to attain maximum exhaust at low speed. Ventilators



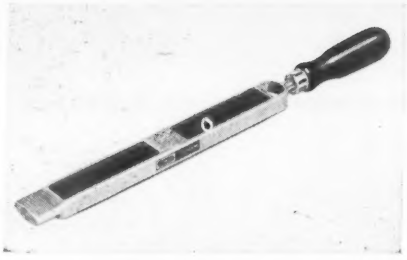
can be furnished with a fusible link which keeps the dampers closed by spring tension when the ventilator is not in use. In case of fire, the link breaks, allowing the dampers to open and smoke and heat to escape, permitting fire-fighters access to the burning area. Operating features of the steel roof exhausters are butterfly dampers that open automatically during fan operation but weather-seal the ventilator when not in use. During fan operation, exhaust air is dissipated with sufficient velocity to exclude rain or snow and prevent exhaust re-entry, it is claimed. Blade diameters are 24 to 60 in. Motor outputs offer an exhaust of 6640 to 53,700 cmf.

For More Details Circle No. 412—Page 219

Finishing Tool

used for forming and finishing all types of surfaces

Stanley Tools, Division of Stanley Works, New Britain, Conn.—Tool for forming and finishing all types of surfaces up to the hardness of mild steel is said to be more efficient than files on all nonferrous metals and work up to ten times faster than rasps or files on wood. Two models —one shaped and used like a hand plane, the other like a rasp—are available. Cutting component has more than 450 separate steel blades. Each cutting edge has a 35-degree angle and semicircular throat through which chips and shavings pass. Ap-



plications include patternmaking, trimming-up castings and finishing nonferrous products.

For More Details Circle No. 413—Page 219

Hardness Testers

are versatile and used for production control processes

American Chain & Cable Co., Wilson Mechanical Instrument Division, 929 Connecticut Ave., Bridgeport 2, Conn.—Semiautomatic, high capacity hardness tester features an illuminated dial gage, indenter light and a so-called Set-O-Matic dial gage. With the latter, the hardness indicator pointer automatically returns to zero when a minor load is applied. Being motorized, the motor's function in the test cycle is to remove the major load. The instrument is said to be versatile and has applications in industry for specification and production control proc-

esses. Its short test cycle permits an increased number of Rockwell readings to be taken and recorded within a definite time period.

For More Details Circle No. 414—Page 219

Portable Stacking Racks

are open-side steel units designed for portability

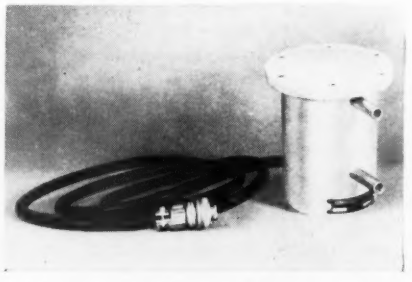
Republic Steel Corp., Pressed Steel Division, 6100 Truscon Ave., Cleveland, O.—Portable stacking racks are designed for handling and storage of package materials, parts or products which cannot be stacked without support. Units are open-side steel frame construction and can be stacked to any practical height when loaded or unloaded. Racks are made to specification.

For More Details Circle No. 415—Page 219

Magnetostriction Transducer

is engineered for metalworking and finishing operations

Acoustica Associates Inc., Glenwood Landing, Long Island, N. Y.—High-power magnetostriction type transducer is for large-scale ultrasonic cleaning, degreasing, descaling, plating and other metalworking and



finishing operations. The company's transducers can be used for degassing melts, automated precision cleaning of large and small complex parts or assemblies of metal or plastic, specialized cutting, drilling and grinding operations, bonding and impregnation.

For More Details Circle No. 416—Page 219

Speed Reducers

can be used on conveyors where mounting flexibility is vital

Philadelphia Gear Works, "G" St. below Erie Ave., Philadelphia 34, Pa.—Line of helical speed reducers has been developed for heavy-duty, low-cost gear drives on conveyors and other installation where mounting flexibility is important. Units are available in reduction ratios from 1.25:1 to 205:1, and in horsepower capacities from 1 to 110. For installation in almost any mounting position, these reducers may be coupled directly or driven from chain or belt drives in either the driver or driven shafts—or both.

For More Details Circle No. 417—Page 219

Portable Resuscitator

can also be used as an inhalator and aspirator

National Cylinder Gas Co., 840 North Michigan Ave., Chicago 11, Ill.—Portable resuscitator is light enough to be carried by one person. It inhales and exhales automatically for the patient being treated, and

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461. Bond Feeder

Haylco Controls Corp., Neenah, Wis.—Information sheet provides data on bond feeder engineered to handle bentonite, wood flour, cereal binder, sea coal or silica flour. Unit contains a storage hopper large enough to store a day's supply of dry material. Material is transported to the mixer where it is measured accurately in individual batches as required.

462. Core Coating

Frederic B. Stevens Inc., 1800 Eighteenth St., Detroit 16, Mich.—Bulletin FP-129 details a zircon base core and mold coating that has a fusion point of 4000° F and can be used on shell molds, resin bonded and cold set cores. Coating is white to enable employee to insure complete coverage by visual inspection.

463. Aluminum Handbook

Aluminum Company of America, 781 Alcoa Bldg., Pittsburgh 19, Pa.—Comprehensive, 176-page reference handbook—"Alcoa Aluminum Handbook" — provides information on standards as well as properties of casting and wrought aluminum alloys. Copies available by writing on company letterhead.

464. Sand Ramming Equipment

Beardsley & Piper Division, Pettibone Mulliken Corp., 2424 North Cicero Ave., Chicago 39, Ill.—Complete specifications on Sandslingers, Speedslingers, Hydra-Slingers and Slinger Roto-Mold units are featured in bulletin 320. The story of Slinger application and adaptation is told in complete detail.

465. Gating Components

Universal Clay Products Co., East First St., Sandusky, O.—Catalog covers company's standard ceramic strainer cores, splash cores, elbows and tubes. All gating components are refractory and reportedly will not affect the cupola if returned with scrap.

466. Isotope Radiography

Budd Co., 2450 Hunting Park Ave., Philadelphia 32, Pa.—Booklet presents understandable data on company's equipment for use in isotope radiography studies using iridium 192, cesium 137, cobalt 60 and thulium 170 as power sources. Construction, applications, safety features and operation of the equipment are emphasized.

467. Barrel Finishing

Almco, Division of Queen Stove Works Inc., Albert Lea, Minn.—Bulletin explains barrel finishing and the variables involved; Almco sample processing laboratories; various types of Supersheen barrel finishing machines and accessory equipment and types and uses of Supersheen medias and finishing compounds.

468. Permanent Mold Coating

Montaine Corp., 2446 South Prairie Ave., Chicago 16, Ill.—Technical bulletin 3 describes Flame Rock M301—

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756	766	776	786	796	806	816	826	836	846	856	866
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an aluminum oxide coating applied as protection to permanent molds by the flamespray process. Steel, cast iron and carbon molds coated with Flame Rock are said to have an extended life and a mold spray is not required during operation.

469. Oven Controls

Minneapolis - Honeywell Regulator Co., Industrial Division, Wayne & Windrim Aves., Philadelphia 44, Pa.—Catalog and price list B43-1 introduces new Electronic special class 14 line of strip chart, circular chart and circular scale instruments. Specifications and prices on thermocouples, radiation detectors, remote bulb thermometer controllers, flame failure safeguards, limit controls, electric and pneumatic valves are included.

470. Dust Collection

American Air Filter Co., 215 Central Ave., Louisville 8, Ky.—Bulletin 270-A1 highlights several types of dust collecting equipment designed to fight foundry dust in grinding, abrasive cleaning, sand handling, shakeout, cupola and melting furnace operations.

471. Cupola Operation

Ironton Fire Brick Co., Ironton, O.—Bulletin File B, No. 2 provides several basic principles of general practice for cupola melting on fixed schedule.

472. Refractories

J. H. France Refractories Co., 3152 France Rd., Snow Shoe, Pa.—Catalog 200 offers seven technical data tables on firebrick, Corindon brick, refractory castables, insulating castables, special castables, high temperature mortars, plastic firebrick and special refractory products.

473. Foundry Equipment

Link-Belt Co., Prudential Plaza, Chicago 1, Ill.—Book 2423 highlights several complete ferrous and nonferrous foundry installations using company's foundry equipment. Tested layouts in these installations are included. Installation photographs showing sand preparation, mold, core, casting and sand handling equipment also are presented.

474. Dust Collector

Research - Cottrell Inc., Bound Brook, N. J.—Bulletin 100 explains the operation and construction of the Cyclo-trell multiple tube dust collector that operates on centrifugal collection principles. Drawings, cutaway views, collection efficiency and capacity nomographs and design data are included.

475. Flooring Brick

Walter Maguire Co., 60 East 42nd St., New York 17, N. Y.—Heavy duty high-heat resistant flooring brick is described in bulletin HR-2. A four-step method for laying the brick also is described.

476. Industrial Compressors

Schramm Inc., West Chester, Pa.—Bulletin SSB-56 shows line of compressors from ½ to 150 hp. Specifications, capacities, dimensions and general engineering data are included.

477. Wet Blasting Process

Cro-Plate Co., 747 Windsor St., Hartford, Conn.—Series of illustrated folders detail a variety of applications for the pressure blast wet blasting process. Deburring, abrasive selection, finishing of molds and dies and cleaning prior to electroplating are among the subjects covered.

478. Trade Shows

Convention Bureau, Standard Printing Service, 30 North Dearborn St., Chicago 2, Ill.—Pamphlet, "13 Suggestions to Help You . . . Get the Most Out of Industrial Trade Shows," demonstrates to the visitor of a convention or exhibit how he can best utilize his time; what to see and not to see and other information of value to the convention-goer.

479. Wheel Belt Grinder

B & E Mfg. Co., 2104 East 31st St., Kansas City, Mo.—Specifications, application photographs and general information on Model 500 contact wheel belt grinder is contained in folder. Grinder has a 7 in. contact wheel diameter, 4 in. idler wheel diameter and belt size is 2½ x 60 in.

480. Thermocouple Insulations

Claud S. Gordon Co., 3000 South Wallace St., Chicago 16, Ill.—Bulletin 300-56 illustrates and describes line of Serv-Rite thermocouple insulators. Listed are dimensions, sizes and types for high thermal shock, high temperature and high mechanical strength applications.

481. Scrap Yard Cranes

Koehring Co., Milwaukee 16, Wis.—Bulletin summarizes company's line of power cranes designed for scrap yard work. They are said to provide the advantages of higher stacking and increased storage capacity in any scrap yard.

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482. Creep Testing Machines

Baldwin - Lima - Hamilton Corp., Electronics & Instrumentation Division, 806 Massachusetts Ave., Cambridge, Mass.—Bulletin provides pertinent data on company's creep testing machines. A spring block type for automatic creep relaxation tests, a spring block type for short time creep rupture tests and a lever type for long time creep tests are illustrated.

483. Crane Scales

Hydroway Scales Inc., 20624 West Eight Mile Rd., Detroit 29, Mich.—Catalog illustrates kinds and types of weighing that can be done with company's crane scales on a crane or hoist. Scales, available in 110 models, are said to be able to weigh anything a crane can lift.

484. Tractor Shovels

Frank G. Hough Co., 703 Seventh St., Libertyville, Ill.—Form 304 presents case histories and industrial material handling applications for Payloader tractor shovels. Specifications on complete line of Payloader models also is provided.

485. Fork Trucks

Clark Equipment Co., Industrial Truck Division, Battle Creek, Mich.—Construction details, operating characteristics and maintenance features of new Clarklift line of fork trucks are described in brochure, "Clarklift Features."

486. Protective Coatings

U. S. Stoneware Co., Plastics & Synthetics Division, Akron 9, O.—Workbook type manual presents painting data in charts, tables, diagrams and illustrations to cover all factors relating to use of Tygon protective coatings in mild to severe corrosive service. Surface preparation, priming, application methods and maintenance instructions are included.

487. Industrial Movies

Eastman Kodak Co., Professional Goods Division, Rochester 4, N. Y.—"High Speed Motion Pictures at the Service of the Engineer" contains five case histories to show how major firms have used motion pictures to solve engineering problems. Data on film, lighting, speed selection and lenses for the Kodak high speed camera are included.

488. Mold Preparation

Marblette Corp., 37-31 30th St., Long Island City 1, N. Y.—Instruction leaflet explains the composition and uses of several mold preparation and mold release formulations made to aid users of casting and laminating resins in plastic tooling and other industrial applications.

489. Centrifugal Air Washer

Ducon Co., 147 East Second St., Mineola, N. Y.—Operation, installation and diversified applications of centrifugal air washer suited to a wide range of applications in industrial dust control are described in bulletin W-7456.

490. Core Trucks

Chicago Mfg. & Distributing Co., 46th & Winchester, Chicago 9, Ill.—Core barrows, core trucks and core racks are illustrated and described in folder. Core truck capacities range to 1400 lb.

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491. Steel Buildings

Stran-Steel Corp., Unit of National Steel Corp., Ecorse, Detroit 29, Mich.—Form 56-1-109 details line of industrial and commercial buildings and accessories. Rigid frame buildings are available in widths of 32, 40, 50, 60, 70 and 80 ft, or multiples of those widths, in bays 20 ft long.

492. Universal Lighting

Sylvania Electric Products Inc., 48th St., Wheeling, W. Va.—Booklet describes the universal applications, advantages and uses of Sylvan-Aire, Sylvania's lighting system which features three-way functional treatment of sight, sound and styling.

493. Plastic Tooling

Bakelite Co., Division of Union Carbide & Carbon Corp., 30 East 42nd St., New York 17, N. Y.—Booklet, "Why Plastic Tooling?" tells how tooling compounds based on Bakelite epoxy resins can cut production costs

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and simplify model making for manufacturers by providing inexpensive, easy-to-build jigs and fixtures, forms, patterns and dies.

494. Checks and Tags

Jas. H. Mathews & Co., 3842 Forbes St., Pittsburgh 13, Pa.—Catalog, "Checks and Tags," is a combination of illustrative, descriptive and technical data relating to metal checks, tags, plates, signs, badges and similar products for identifying items of all kinds.

495. Engineered Systems

U. S. Hoffman Machinery Corp., Industrial Division, 103 Fourth Ave., New York 3, N. Y.—Folder M-133 lists and describes blowers, exhausters, pneumatic systems, filters, flotation equipment, separators, stills, tubular pipe and fittings and industrial vacuum cleaners.

496. Conveyor Pulleys

R. & J. Dick Co., Dept. P, 1 Sade St., Passaic, N. J.—Price catalog CP-80 gives detailed specifications and prices on conveyor pulleys for original installation or replacement on production, portable and general conveyor lines.

497. Castable Refractories

Plibrico Co., 1800 Kingsbury St., Chicago 14, Ill.—Advantages, characteristics and applications of super duty, first quality, intermediate, abrasion resistant and insulating castables are detailed in catalog.

498. Crane Operation

Allis-Chalmers Mfg. Co., Safety Services Section, Box 512, Milwaukee 1, Wis.—Pocket-size crane operation and hitching manual has been written for the instruction of personnel in rules and practices required to assure safety in this work.

499. Welding Catalog

Modern Engineering Co., Dept. 139, 3407 Pine Blvd., St. Louis 3, Mo.—Revision of general welding catalog 150 covers line of oxyacetylene welding and cutting torches, machine cutting torches, regulators, pressure gages, hose connections, couplings and safety equipment.

500. Testing Machines

Detroit Testing Machine Co., 9390 Grinnell Ave., Detroit 13, Mich.—Pocket size catalog contains pictures and information describing ten different testing machines to determine the hardness, ductility and tensile, compression and transverse strength of metal parts.

501. Gravity Conveyors

A. B. Farquhar Division, Oliver Corp., North Duke St., York, Pa.—Wheel and roller type gravity conveyors are illustrated and described in bulletin 801. All-steel and aluminum models are available.

502. Magnesium Dust Collection

Peters-Dalton Inc., 17900 Ryan Rd., Detroit 12, Mich.—Brochure, "Wet Method is Best," describes methods of collecting and controlling magnesium alloy dust and fumes.

503. Lift Trucks

Hyster Co., 2902 North East Clackamas St., Portland 8, Oreg.—Brochure 1487 provides reference data on 25 industrial truck models ranging from 1000 to 30,000 lb capacity.

504. Bronze Globe Valves

Lunkenheimer Co., Box 360, Cincinnati 14, O.—Circular 602-2 details two pressure classes of bronze globe valves for a wide variety of services from normal to exceptionally severe. One is rated at 150 lb, S.P., 300 lb W.O.G., the other at 200 lb, S.P., 550° F, 400 lb W.O.G.

FOUNDRY Reprints

505. Automatic Casting

Automatic Casting of Aluminum Employs Continuous Melting by Jack C. Miske details operating features of new type aluminum melting furnace that provides a continuous supply of metal to an automatic pouring unit mounted on turntables and indexed to a position under the pouring ladles.

506. Plastic Core Driers

Dual Purpose Plastic Core Driers by Don W. Schmanski presents general specifications and uses for a high-impact, heat-resistant, thermosetting molding compound suitable for all core driers. Driers can be used in high-frequency dielectric ovens and in hot air type ovens.

507. Automated Molding Line

Automated Molding Line by Robert H. Herrmann pinpoints production methods for automated and semiautomated molding lines and related sections of the gray iron foundry of Central Specialty Division, King-Seeley Corp., Ypsilanti, Mich.

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adjusts to his lung capacity. As an aspirator, it furnishes sufficient suction to clear water, mucus or vomitus from the throat. As an inhalator, it supplies oxygen to be absorbed by

spontaneous respiration. Carrying case is made of aluminum alloy, impervious to moisture, grease and stains. Over-all dimensions are 8¾ x 18¼ x 24¼ in.

For More Details Circle No. 418—Page 219

Sanitizer

removes grease and grime from respirators, goggles and masks

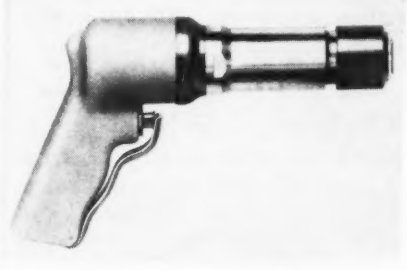
Pulmosan Safety Equipment Corp., 644 Pacific St., Brooklyn 17, N. Y.—Sanitizer is said to be effective for removing grease, grime and dirt from respirators, goggles and masks. Material is a neutral cleaner and rinses free in water. It contains an odorless deodorant and leaves treated surfaces essentially free of living organisms.

For More Details Circle No. 419—Page 219

Heavy-Duty Air Hammer

delivers 2200 blows per minute at less than 80 psi

Superior Pneumatic & Mfg. Co., 4758 Warner Rd., Cleveland, O.—Heavy-duty air hammer delivers 2200 blows per minute at less than 80 psi, weighs less than 4 lb, yet is claimed to be extremely maneuverable. A patented safety chuck locks the various tools used with the hammer in six different positions. According to



the manufacturer, the hammer can do heavy cutting, chipping, chiseling or grooving but is so light and easy to handle that operator fatigue is minimized.

For More Details Circle No. 420—Page 219

Solenoid Valve

does not require back pressure for efficient operation

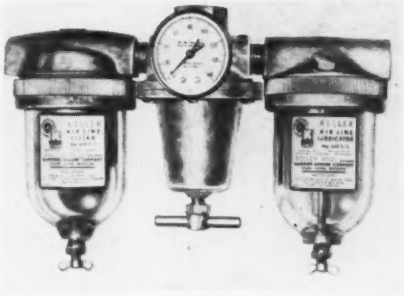
Magnatrol Valve Corp., 72 Fifth Ave., Hawthorne, N. J.—Full port, normally closed, packless solenoid valve is said not to require back pressure for efficient operation. It automatically controls flow of water, oil, brine, solvents, gas or air at fluid temperatures up to 212°F. The valve opens when the hermetically-sealed solenoid is energized. An auxiliary operating piston, integral with the disk holder, assists the solenoid in opening the valve against higher line pressures. In the open position the valve is not affected by flow or back pressure. In the closed position line pressure is on top of the disk. Valve bodies have threaded ends in sizes from ½ to 3 in. Optional accessories include handlift or handlever for manual control, metering stem for throttling control or dashpot. Strainers are available in all sizes for lines carrying sediment.

For More Details Circle No. 421—Page 219

Air Line Filter

drains from the bottom without removing the bowl

Keller Tool Division, Gardner-Denver Co., Grand Haven, Mich.—Air line filter-regulator-lubricator drains from bottom without removing the bowl. Pressure regulator operates in an inverted position to permit a compact, space-saving installation that can be designed into any air-powered equipment. The filter-regu-



lator-lubricator is available in any combination or as individual units for ⅜, ½ or ¾-in. compressed air lines.

For More Details Circle No. 422—Page 219

Engine Driven Welders

in 300 and 400-amp models are built for heavy-duty use

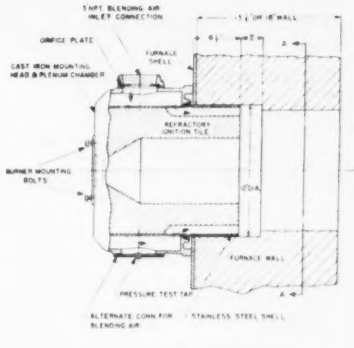
Welding Dept., General Electric Co., Schenectady 5, N. Y.—Engine-driven welder with battery start and direct coupling between engine and generator is available in 300 and 400-amp models. Built for heavy-duty service, the unit has no projecting generator or controls that can be damaged in on-the-job operation.

Flame Unit Aids Complete Fuel Combustion

BLENDED flame unit reportedly is an effective means of using excess air—up to 1000 per cent—to insure complete fuel combustion and obtain better circulation of heat at temperatures of 400 to 1800° F in industrial furnaces, ovens, kilns and other heat processing equipment.

By thoroughly diluting the high combustion products with excess air, these products are increased in volume, while their average temperature is reduced. Thus, with this expanded volume of gases, circulation and distribution of heat is improved with greater uniformity of temperature throughout the heating chamber. Localized hot spots which occur in the use of relatively smaller volume of undiluted, high-temperature products of combustion are avoided. The wide range of temperatures which can be produced promotes flexibility in operation of the equipment.

The blended flame unit consists of a cast iron mounting head and plenum chamber with an inlet for



blending air, burner mounting bolts and a refractory ignition tile within a stainless steel shell. The unit is designed to assure a stable flame and prevent entry of excess air from interfering with the ignition and combustion of the fuel within the refractory tile. The excess air flow is outside the tile so that blending takes place only at the tile outlet and the periphery of flame. The blender is made by Hauck Mfg. Co., 124-136 Tenth St., Brooklyn 15, N. Y.

For More Details Circle No. 447—Page 219

SAFE HOISTING

THAT PAYS OFF IN SAVINGS

Safety comes first wherever foundrymen handle fragile and hazardous loads. The Series "600" 'Load Lifter' Electric Hoist assures all-around protection. It has *two* powerful brakes that act simultaneously, yet one alone can hold the full load. Starts and stops are fast — loads can be "inched" accurately at the push of a button. Cores can be set, patterns drawn, ladles tipped, molds parted and flasks stripped with complete ease and safety.

The Series "600" 'Load Lifter' also provides: non-fracturing load hook, tough wire rope, rugged aluminum alloy frame, upper limit stop, enclosed operating parts, and safe 24 volts at the push buttons. Here is quality you can always count on! So — begin now to cut costs through safe, economical hoisting. The Series "600" 'Load Lifter' is built in ½ and 1-ton sizes. Choice of suspension, including motorized trolley. Learn all about this rugged electric hoist from *your "Shaw-Box" Distributor — or write us for Bulletin 408.*

'Load Lifter'® ELECTRIC HOISTS

MAXWELL MANNING M&M & MOORE INC. TRADE MARK

MANNING, MAXWELL & MOORE, INC.

MUSKEGON, MICHIGAN

Builders of "SHAW-BOX" and 'LOAD LIFTER' Cranes, 'BUDGIT' and 'LOAD LIFTER' Hoists and other lifting specialties. Makers of 'ASHCROFT' Gauges, 'HANCOCK' Valves, 'CONSOLIDATED' Safety and Relief Valves, 'AMERICAN' and 'AMERICAN-MICROSEN' Industrial Instruments, and Aircraft Products.

Circle 699 on Inquiry Card—Page 219

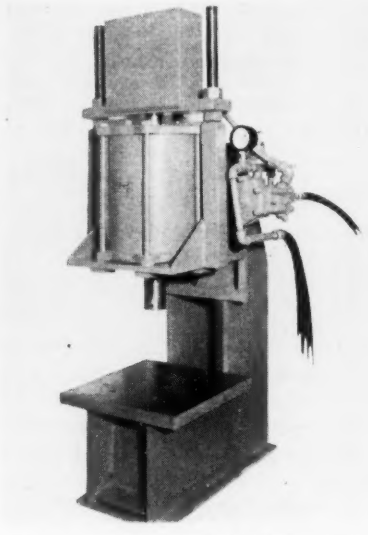
Both models have a duty-cycle of 60 per cent, rated temperature rise of 50° C, open-circuit voltage of 80 and operate at a maximum 2150 rpm. The 300-amp unit has a welding range of 50 to 375 amps and electrode capacity of $\frac{3}{32}$ to $\frac{5}{16}$ in. The 400-amp unit has an operating range of 80 to 500 amps and electrode capacity of $\frac{1}{8}$ to $\frac{3}{8}$ in.

For More Details Circle No. 423—Page 219

Air Arbor Presses

are said to fill gap between air arbor and hydraulic presses

Van Products Co., 5738 Old Ridge Rd., Erie 7, Pa.—Line of air arbor presses includes 16 models, ranging



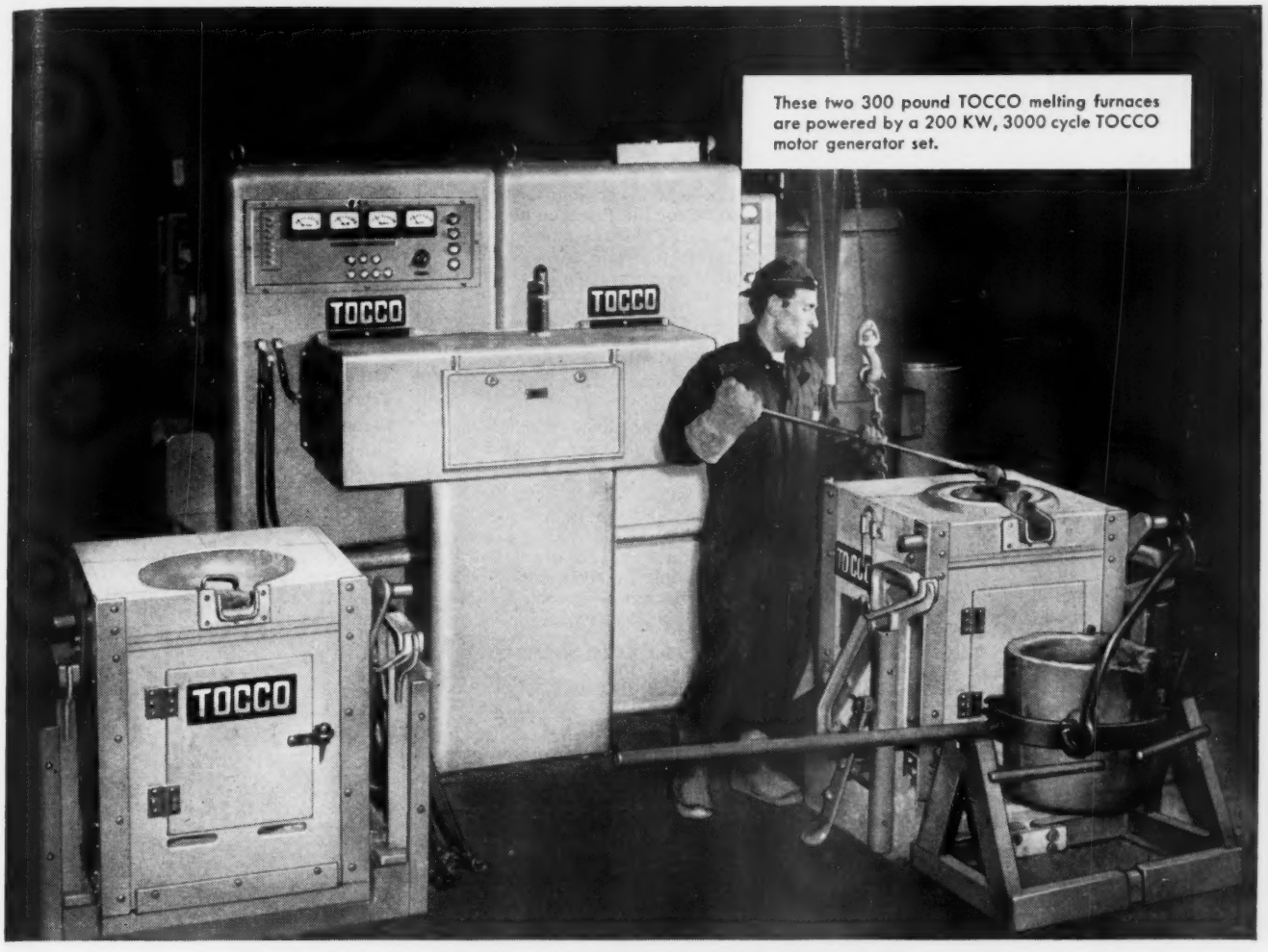
from 1 to 5 tons, either hand or foot controlled. Throat clearance ranges up to 6¾ in. with adjustable ram clearance up to 12 in. Stroke clearance may be had from a minimum of 2 in. in increments of 1 in., up to maximum daylight. Units up to 2 tons have 1½-in. OD rams. Larger units have 2-in. OD rams. Most rams are keyed for nonrotation. Presses can be used for cutting gates from castings, or for riveting, forming, bending and press fitting.

For More Details Circle No. 424—Page 219

Lubricant

is adaptable for parts operating at high speeds and loads

Electrofilm Inc., P.O. Box 106, North Hollywood, Calif.—Air-dry solid film lubricant is available in a spray-on, aerosol bomb. When sprayed on metallic or nonmetallic parts the resin-base lubricant increases wearlife by decreasing the coefficient of friction of these parts. It operates in a temperature range from −300 to +500° F and is well adapted for parts operating at high speeds and high loads. The lubri-



These two 300 pound TOCCO melting furnaces are powered by a 200 KW, 3000 cycle TOCCO motor generator set.

TOCCO* Induction Melting "Delivers"— In Two Days Instead of Two Months!

Casting backlogs at Commercial Shearing and Stamping Co. in Youngstown, Ohio used to lag from 8 to 10 weeks behind production schedules. By installing four 300 pound TOCCO melting furnaces this firm upped daily melting capacity to 16,000 pounds. Now orders can be shipped in 48 to 72 hours.

In a foundry occupying less than 5000 square feet of space, production of castings jumped between 40% and 50%; tensile strength of alloy castings was boosted from 35,000 to 50,000 p.s.i. Substantial savings in the cost of castings have resulted. Moreover, with precision casting and molding on a push-button basis, many former drilling and roughing operations were completely eliminated.

Many firms have discovered that TOCCO Induction Melting insures maximum quality control, increased volume and lower operating costs—foundry premiums directly linked to TOCCO's rapid melting, simplicity of operation, low alloy loss, constant burn off and pinpoint quality control.

THE OHIO CRANKSHAFT COMPANY

TOCCO

*Trade Mark Reg. U. S. Pat. Off.

Mail Coupon Today

NEW FREE BULLETIN

THE OHIO CRANKSHAFT CO.
Dept. F10, Cleveland 5, Ohio

Please send copy of "The Case for TOCCO Induction Melting."

Name_____

Position_____

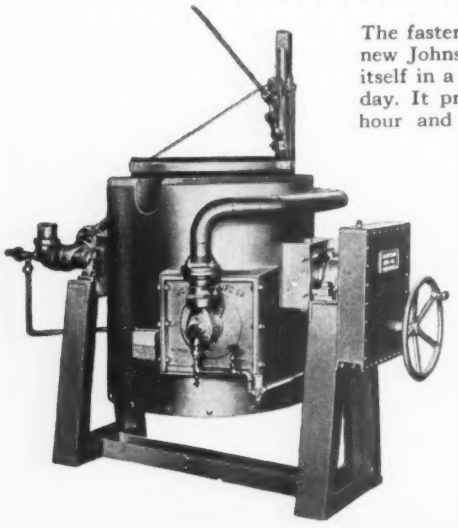
Company_____

Address_____

City_____ Zone____ State____

CRUCIBLE FURNACE

Melts 1200 Lbs. of Brass IN 1 Hour, 10 Minutes!



The faster the furnace—the lower your cost. The new Johnston No. 400 Crucible Furnace pays for itself in a hurry by hustling more heats into every day. It produces 1200 lbs. of molten brass in 1 hour and 10 minutes on successive heats, gas fired (may also be oil fired as is model shown). Johnston burners, blowers and experienced engineering combine to produce unusual speed with economically low fuel consumption.

A new enclosed tilting mechanism makes tilting easier than ever before and it may be electrically driven.

Crucible life and lining life are extremely good. Trunnions are adjustable for best balance and are supported on large pillow block bearings. A simple, convenient cover lifting mechanism is operated from the front of the furnace.

WRITE FOR CATALOG 223F

OVER THIRTY YEARS EXPERIENCE IN THE DESIGN AND MANUFACTURE OF INDUSTRIAL HEATING EQUIPMENT

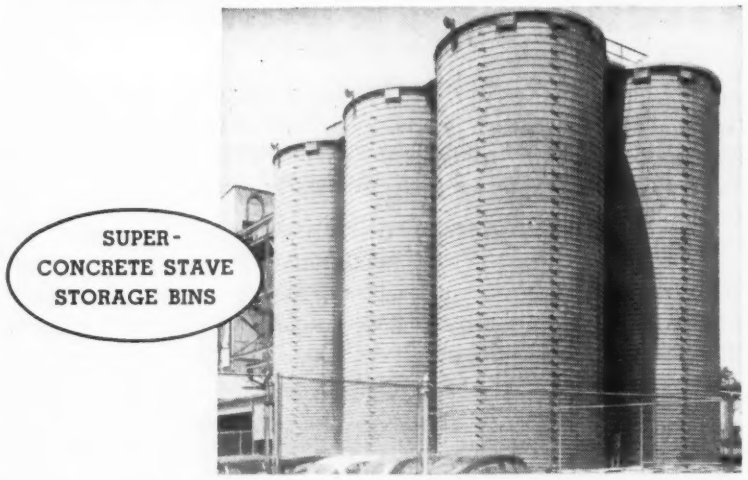
THE JOHNSTON LINE — SAFETY — DEPENDABILITY

JOHNSTON MANUFACTURING CO.
2825 EAST HENNEPIN AVE.
MINNEAPOLIS 13, MINN.

ENGINEERS & MANUFACTURERS OF INDUSTRIAL HEATING EQUIPMENT

Circle 701 on Inquiry Card—Page 219

There's a heavy conveying system atop these Neff and Fry Bins



A continuous reinforced concrete roof on the six 20' x 52½' bins carries a big screw conveyor with piers, chutes, etc. Observe that there are no additional supports from the ground. The bins themselves support the entire load.

This strikingly proves the load-bearing strength of Neff & Fry Bins. Of course, the bins also have the lateral strength to contain 4,000 tons of grain.

The walls of Neff & Fry Bins are constructed of Super-Concrete Staves. For a complete understanding, read our folder, "Bins With the Strength of Pillars." Ask for it now before you forget.

NOT EXPORTED
EXCEPT TO CANADA AND MEXICO

THE NEFF & FRY CO.
214 ELM ST. • CAMDEN, OHIO

Circle 702 on Inquiry Card—Page 219

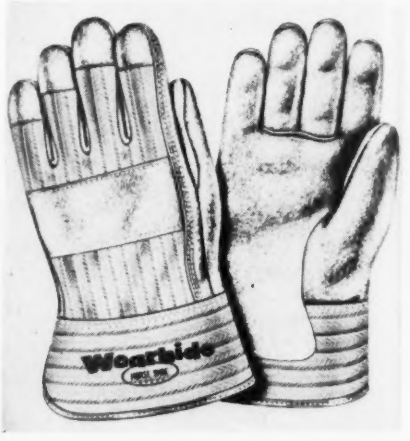
cant dries in 30 minutes and can be used in conjunction with oils and greases where oil is necessary, as a cooling agent, or it can be used without oils and greases when cooling is not a necessary function of the lubricant.

For More Details Circle No. 425—Page 219

Work Gloves

are said to feature an exceptionally long wearing leather

Wearhide Glove Co., Rockford, Mich.—Industrial gloves feature a new leather claimed to give up to three times as much wear as other work glove leathers. Gloves are flexible for complete freedom of



movement and may be dry cleaned satisfactorily. The new line of gloves includes three basic styles: Safety cuff, gauntlet and knit wrist patterns. All styles have canvas backs.

For More Details Circle No. 426—Page 219

Hydraulic Lift Table

of welded steel construction can be hand or foot operated

Dept. HT, Lexco Engineering & Mfg. Corp., P. O. Box 161, Colmar, Pa.—Hydraulic lift table constructed of welded steel is mounted on two 5-in., rigid casters and two 5-in., swivel casters for easy movability. A floor lock, controlled by foot pedal and toe release, anchors the truck in position when in use. Table capacity is 2000 lb; capacity of the hydraulic unit, hand or foot operated, is 3000 lb. Tables are available in sizes of 20 x 30 in., or 30 x 30-in. All models are 30-in. high plus an 18 in. rise.

For More Details Circle No. 427—Page 219

Portable Space Heater

can be used for permanent, supplementary or spot heating

Scheu Products Co., 297 Stowell St., Upland, Calif.—Portable space heater produces 70,000 to 140,000 Btu's per hr while using ½ to 1 gal

of fuel oil. When used as recommended, heaters require no venting. Units are said to be ideal for foundries, machine shops or other locations where there might be hard-to-

heat open or semiopen areas. Manufacturer reports the heater operates on a patented return gas principle that ends smoke and eliminates soot.

For More Details Circle No. 428—Page 219

Fluorescent Lamp

for universal applications is said to give increased light

Sylvania Electric Products Inc., 1740 Broadway, New York 19, N. Y. —New standard-shaped, very high output flourescent lamps are said to give two and one-half times as much light as conventional models. Features of the new lamps are a more efficient lamp diameter, rapid start continuous filament heating, pressure control center and the use of neon instead of argon. The lamps may be used for indoor or outdoor service and are well adapted to high, medium and low bay industrial lighting. They use the same type of recessed double contact base as the high output rapid start lamp family.

For More Details Circle No. 429—Page 219

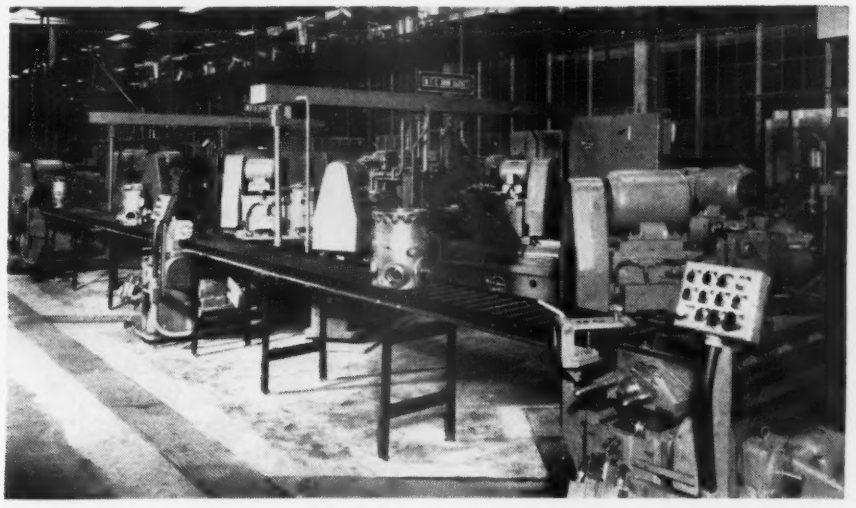
Battery Trays

conform to recently adopted industrial truck standards

Exide Industrial Division, Electric Storage Battery Co., Philadelphia, Pa.—All-steel battery trays for electric-powered hand trucks conform to dimensions and practices recently adopted by the Industrial Truck Association. Trays are classified according to ITA hand truck battery groups one through nine, ranging

Ask Standard

how to cut costs with conveyors

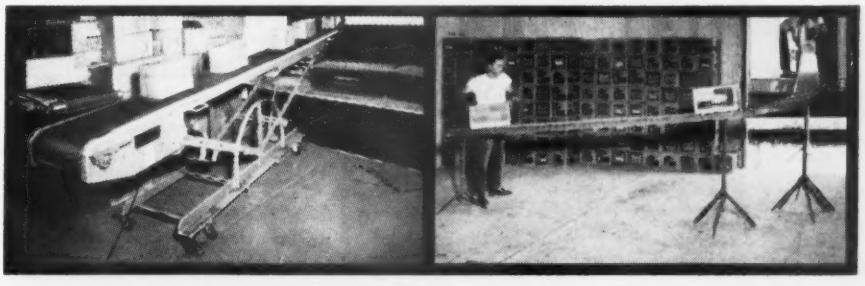


Standard gravity roller conveyors like this are modest in cost, easy to install and maintain.

Conveyor system helps Airtemp up compressor parts production 40%

To handle stepped-up demands for residential and industrial air conditioners, the Airtemp Division of the Chrysler Corporation undertook an extensive re-tooling program. On one compressor crankcase line, for example, they installed 17 new machine tools . . . connected them all with Standard gravity roller conveyors. Result — two hours saving per case, production up 40%.

If you're planning on modernizing or retooling it will pay you, too, to find out how Standard conveyors can complement new equipment . . . give you lower overall costs and greater productive efficiency. STANDARD CONVEYOR COMPANY, North St. Paul 9, Minnesota. Sales and Service in Principal cities.



To expedite shipping or stocking and reduce handling costs, investigate Standard lightweight portable roller conveyors (right) or the portable, self-powered HANDIBELT conveyor (left), which can be used horizontally or at varying incline or decline angles.

For details — contact the Standard representative listed in the classified phone book or write direct. Ask for Bulletin N-10.

Standard 50 years of conveyor experience

GRAVITY & POWER CONVEYORS

Circle 703 on Inquiry Card—Page 219

in width from 6⅝ to 18¼ in. and are available for 12, 18 and 24-v hand truck batteries. Trays are available for 64 models of the company's motive power batteries. Trays are of welded steel. Two four-fingered grip and cable openings at the top of both sides of the trays allow ample space for safe and convenient raising of the cover. Covers may be hinged at front or back of the tray. They are held closed by a spring steel clip and the covers open flush with the vertical plane of the back of the box.

For More Details Circle No. 430—Page 219

Air Controller

features high stability without loss of sensitivity

The Bristol Co., Waterbury 20, Conn.—Controller features high stability of control action without loss of sensitivity, coupled with a wide proportional band. It is intended for measuring and controlling such variables as pressure, vacuum, temperature, liquid level, flow, differential pressure and mechanical motion. Control modes available include narrow band (on-off), proportional, reset, derivative, and reset plus derivative. Claimed features are wide proportional band width (½ to 400 per cent) with easy shift in width, full zero derivative setting on triple mode controller, reset action stops for prolonged deviation from set point under severe load changes, easy reversal of action, and a precision linkage arrangement allowing complete disassembly and recalibration.

For More Details Circle No. 431—Page 219

Portable Crane

weighs 350 lb and is made for general duty requirements

Sasgen Derrick Co., Dept. FYC, 3101 West Grand Ave., Chicago 22, Ill.—Portable crane weighs 350 lb yet will carry a 3000-lb load on a

single line with one man at the crank. It has been tested to stand a full 100 per cent overload, according to the manufacturer. Spur gear winch operates with low friction and requires seven turns of the crank to gain a complete drum revolution and lift the load 1 ft. Two sizes are made: No. 1-C, with over-all height of 7 ft, 6 in. and No. 2-C, with over-all height of 9 ft. Both sizes have 3000-lb capacities.

For More Details Circle No. 432—Page 219

Scale Indicator

is seminull balance, servo-type for indications up to 1800° F

Automatic Temperature Control Co., 5200 Pulaski Ave., Philadelphia 44, Pa.—Miniature vertical scale indicator provides a compact, easily read instrument with minimum price and adequate performance as important features. It is a seminull balance, servo-type indicator for use with differential transformers and resistance bulb or thermister inputs. Its 6-in. vertical scale with 1 per

STOP
WASTING
GRINDING WHEELS
AND
INCREASE PRODUCTION
with the famous
STANDARD
infinitely
variable speed
SNAGGING
GRINDER
35 A
TURN HAND WHEEL—automatically adjusts guard, increases spindle speed in relation to worn wheel—you get FULL WHEEL WEAR DOWN TO FLANGES! Foundries report as much as 100% increase in wheel life.
INFINITELY VARIABLE SPEED means proper peripheral speed at all stages of wheel wear—AS MUCH AS 60% INCREASED PRODUCTION FROM CONSTANTLY CORRECT WHEEL SPEED AT POINT OF GRINDING!
Booth 1047 • Metal Show • Cleveland • Oct. 8-12
SINCE 1912
the STANDARD electrical tool co.
FOUNDRY GRINDER DIVISION
2507 RIVER ROAD • CINCINNATI 4, • OHIO
STANDARD
HALLMARK OF METALWORKING THROUGHOUT THE WORLD

Circle 704 on Inquiry Card—Page 219

cent graduations and readability to ½-per cent is well illuminated. The unit may be used for temperature indication up to 1800° F.

For More Details Circle No. 433—Page 219

Solenoid Valves

are to control flow of fuel to industrial atomizing burners

Automatic Switch Co., 391 Lakeside Ave., Orange, N. J.—Pilot-operated solenoid valve has a full ¾-in. port, a pressure range of 15 to 300 psi and handles heavy fuels up to 200° F. The valve is closed when the solenoid is de-energized and open when the solenoid is energized. It is used to control, automatically, the flow of heavy fuels to large industrial rotary and high pressure atomizing burners. Valve features include tight shut-off, positive operation, built-in strainer, simplified inspection and cleaning, and low pressure drop.

For More Details Circle No. 434—Page 219

Dial Indicator Set

provides a range of indicators to handle most gaging jobs

L. S. Starrett Co., Athol, Mass.—Set of three dial indicators provides in one compact kit a complete range of dial indicators to handle most gaging jobs. Furnished in a mahogany case, the set contains three indicators: A No. 25-111 indicator graduated 0.0001 in., reading 0-5-0, range 0.025 in.; a No. 25-131 indicator graduated 0.0005 in., reading 0-25-0, range 0.125 in. and a No. 25-441 indicator graduated 0.001 in., reading 0-100, range 1.000 in. The indicators feature simplified construction, easy-reading dials and a no-glare satin chrome finished case.

For More Details Circle No. 435—Page 219

Ventilator Unit

has low contour and deflects expelled air downward to roof

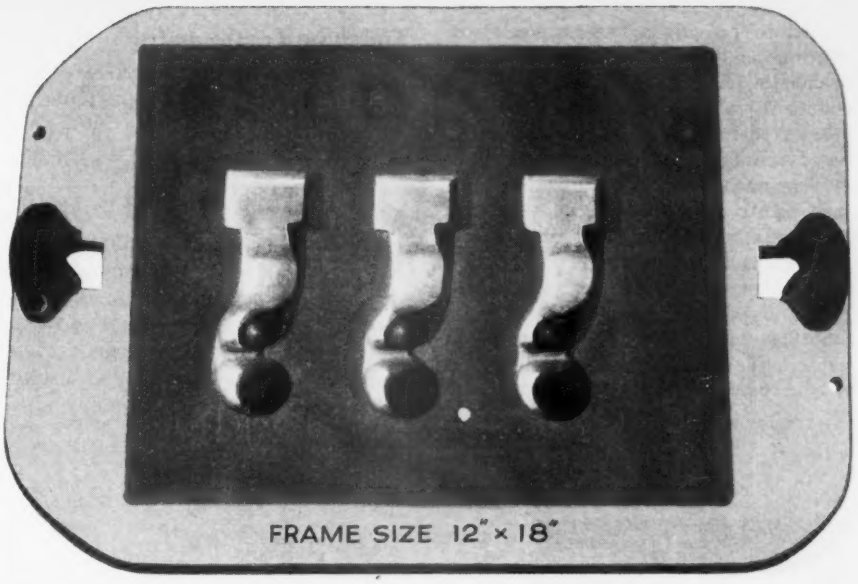
Swartwout Co., 18511 Euclid Ave., Cleveland 12, O.—Rectangular ventilator designed to deflect expelled air downward is for use where individual units of low contour are indicated. Eleven throat sizes are offered in both gravity and powered models. The latter is available also as a fresh air intake.

For More Details Circle No. 436—Page 219

Oil-Mist Lubricators

provide continuous lubrication on reduced amounts of oil

Stewart-Warner Corp., Alemite Division, 1826 Diversey Pkwy., Chicago 14, Ill.—Oil-mist lubricators are de-



"The type of work we produce in TAMASTONE we would be unable to make at all in the absence of skilled help!"

COLUMBUS BRASS & ALUMINUM CO., INC., Columbus, Indiana

This Drier equipment pattern is for a port core box on a diesel engine and is made from an original master pattern. *Only one shrinkage!* Material is aluminum. Pattern was used for 100 Driers. Only 2 hours labor and 20 pounds of TAMASTONE were required. Up to 1,000 castings have been made from a plate of this type!

No special skill needed to increase production 400% or more! . . . WRITE . . .

TAMMS INDUSTRIES, INC., 228 N. LaSalle St., Chicago 1, Ill.

Circle 705 on Inquiry Card—Page 219

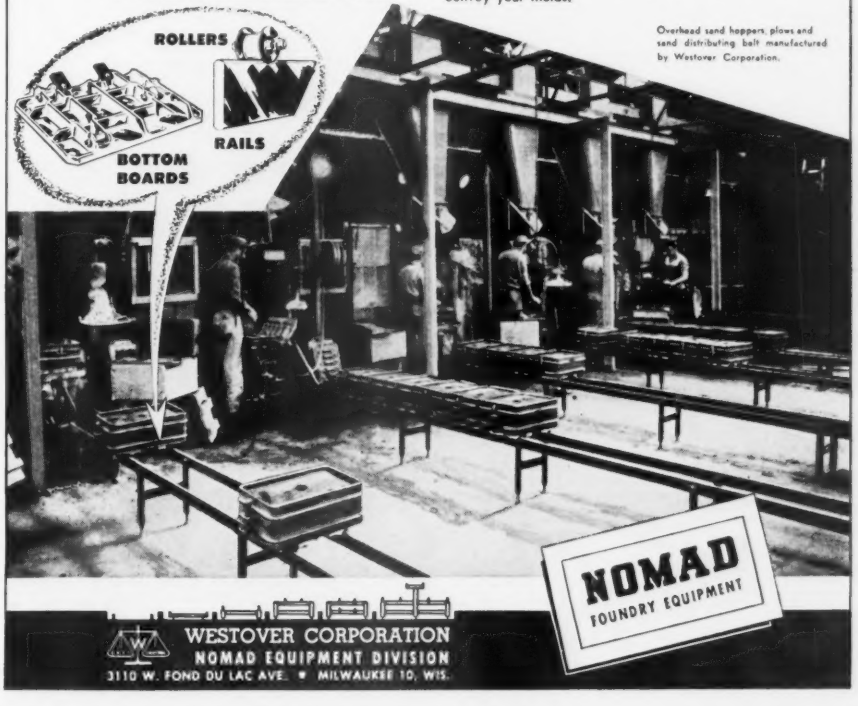
THE NOMAD WAY TO EQUIP YOUR FOUNDRY . . .

Get

- INCREASED PRODUCTIVITY
- REDUCED MANPOWER
- ECONOMY OF SPACE
- REDUCED SCRAP
- LOW COST MODERNIZATION

Nomad Conveyor Systems just can't be beat for elimination of mold damage, ease of handling, versatility of use and simple, sturdy construction. Nomad equipment is adaptable to meet the individual requirements of **your** operation.

Check your plans and the condition of your present equipment. Then choose Nomad for the ***modern*** way to convey your molds.



WESTOVER CORPORATION
NOMAD EQUIPMENT DIVISION
3110 W. FOND DU LAC AVE. • MILWAUKEE 10, WIS.

Circle 706 on Inquiry Card—Page 219

signed to provide a "48-hr week" of continuous lubrication for up to 300 or 500 bearing inches (1 bearing in. equals 1 in. of shaft diameter) of lubricated mechanisms while consuming a reduced amount of oil. Oil-mist system uses compressed air to atomize oil into mist (oil particles lighter than oil) which is then distributed through tubing to all types of mechanisms requiring lubrication. Lubricators reportedly operate efficiently whether in compact installation or extended over a 400-ft distance.

For More Details Circle No. 437—Page 219

Finishing Compounds

are designed for the barrel finishing of various metals

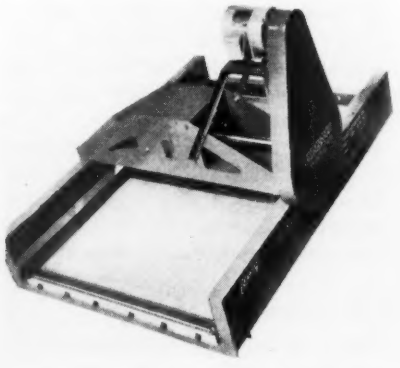
Oakite Products Inc., 19 Rector St., New York 6, N. Y.—Three barrel finishing compounds have been added to company's line of finishing materials. Oakite FM-183 is an alkaline abrasive type compound for deburring steel, stainless steel and zinc die castings. Oakite FM-184 is an acidic compound designed to deburr, remove heat scale and brighten steel, stainless steel, copper and brass parts. Oakite FM-186 is an alkaline product designed to produce a brighter finish and better color on zinc die castings.

For More Details Circle No. 438—Page 219

High Motor Mount

is used on company's Model E heavy-duty vibrating screen

Deister Concentrator Co., Glasgow & Wayne Sts., Ft. Wayne 1, Ind.—Special high motor mount is for use on company's Model E heavy-duty vibrating screen to meet installation



conditions where screens are to be placed side by side in a battery to save space. The standard drive arrangement requires the motor to be supported on an outboard bracket. The high motor mount permits swinging the motor inward and leaves only the width of the drive guard as a projection.

For More Details Circle No. 439—Page 219

LP Gas Conversion Kit

is adaptable to all makes of industrial lift trucks

Industrial Gastruck Inc., 2019 Dempster St., Evanston, Ill.—Preassembled kit permits converting all makes of industrial lift trucks to LP gas operation in 3 or 4 hr. All lines, fittings and carburetion assembly are mounted for bolt-on arrangement. All parts are made to proper size to fit any model, shape or size of truck. All parts are identified for simple installation. Kit comes complete with fuel cylinder bracket, toggle and strap to hold cylinder in position and location pin to carburetion linkage.

For More Details Circle No. 440—Page 219

Gyratory Riddles

provide the capacity equal to that of 20 men riddling by hand

Great Western Mfg. Co., Leavenworth, Kans.—Round or square gyratory riddles, 24 in. in diam, have capacity to sift, mix, aerate and fluff foundry sand with capacity equal to that of 20 men riddling by hand.

HERE'S PROOF... AND A PROMISE of increases in Service Life up to 100% with .....

WALSH MULLITEX SUPER DUTY FIRE BRICK

In non-ferrous melting operations, Mullitex, Dry Press Process, Missouri Quality Fire Brick has demonstrated its superiority by actually producing increases in service life up to 100%.* Not in one single instance on record has Mullitex failed to show an appreciable increase in length of service.

Isn't this the kind of performance you want in your rotary or stationary furnaces. The facts are all here for you. Write today for complete details.

*Names on request.

NOTE: And for added savings Mullitex Fire Brick laid up with Mullitex Extra Duty Cement is the *perfect combination.*

WALSH REFRACTORIES CORPORATION — America's Best Clays

WALSH REFRACTORIES CORP.

101 Ferry Street • St. Louis 7, Missouri

60 years manufacturers of high grade refractories

Circle 707 on Inquiry Card—Page 219

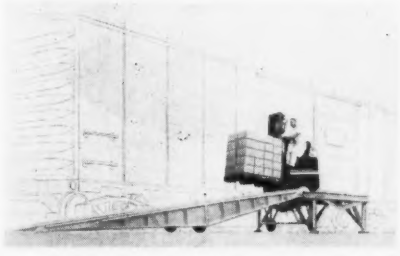
round riddle is for screening molding and core sands or medium fine, coarse dry and sticky materials. Square riddle is for screening molding and core sand or medium fine and coarse dry materials. Riddles are powered by special vertical geared head motors of ⅓-hp that operate the riddles at about 287 rpm.

For More Details Circle No. 441—Page 219

Platform Table

supplements company's equipment for railroad car loading

Magline Inc., 1900 Mercer St., Pinconning, Mich.—Portable magnesium platform table is used in conjunction with company's mobile loading ramp, permitting parallel loading of rail



cars where track-side space is limited. Platform measures 8 x 8 ft and can be positioned by lift truck at car door opening. Ramp is then locked in place at side of platform parallel to track, and a dock board bridges the gap between platform and car entrance. Tables are engineered for loads up to 16,000 lb.

For More Details Circle No. 442—Page 219

Mechanical Pallet Truck

lifts or moves loads on single or double-face pallets

Rack Engineering Co., 133 Sixth St., Connellsville, Pa.—Mechanical pallet truck is of all-welded steel construction and will hold 1500 lb in lifting and moving loads on single or double-face pallets or other types of material handling equipment. Steel ball bearing swivel casters are said to make steering easy. Lightweight handle reportedly makes lifting, pushing and pulling easy one-man operations.

For More Details Circle No. 443—Page 219

Stress Analysis Material

is for use in 3-dimensional photoelastic stress studies

Houghton Laboratories Inc., Olean, N. Y.—Improved product for use in three-dimensional photoelastic stress analysis studies is available in sheets, rods and tubes. Sizes and dimensions are in wide range. In sheets, thicknesses are from ¼ to 1½ in. in sizes 18 x 24 and 24 x 24 in. Rods are in diameters of ½ to 5 in., lengths 30 to 36 in. Tubes range in diameter from 1 to 3 in. and lengths of 30 to 36 in.

For More Details Circle No. 444—Page 219

Vertical Drafting Board

is designed to reduce draftsman fatigue and minimize errors

L. A. B. Corp., 1064 Onondaga St., Skaneateles, N. Y.—Vertical drafting board, designed to reduce draftsman fatigue, is available in two models, one with a fixed board angle of 15 degrees from vertical and the other adjustable through an arc of 85 degrees from vertical. Both models have an up and down adjustment of 20 in., permitting draftsman to work, seated or standing, at optimum visual angle on any area of the board. Vertical adjustment is held by a foot-operated lock mechanism. Board is lightweight, aluminum-lined, honeycomb sandwich construction said to be warpproof and sufficiently rigid to withstand heavy loads without deflection.

For More Details Circle No. 445—Page 219

Don't Waste Money!

MIXING CORE PASTE BY HAND

MABCO

REDDY CORE PASTE

The Modern Method dispensed with a common Barrel Pump

Mabco Reddy Core Paste is of a conventional type and best of all, is ready to use as you get it. No longer is it necessary to mix your core paste by hand.

All These Advantages . . .

- **Ready to Use**
- **No lost time waiting while mixing**
- **No wasted paste**
- **No waiting time required for setting**

A 2 " molasses gate may be used instead of a pump if desired or if pump is not available.

Write us for full information and prices.

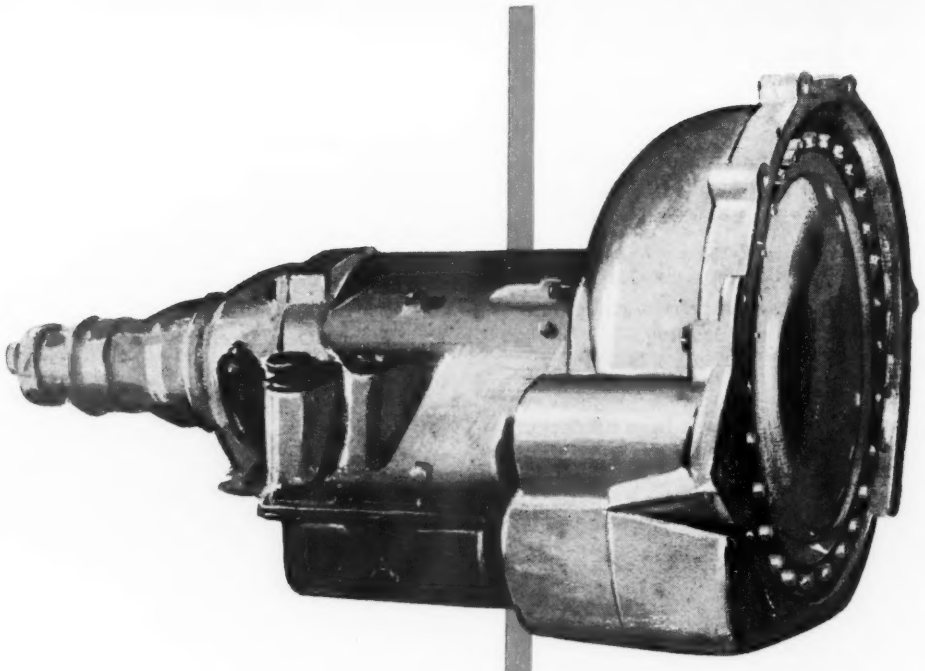
M. A. BELL CO.

217 Lombard - St. Louis 2, Mo.

5802 Colfax - Houston 20, Tex.

"Serving the foundry industry over 30 years"

Circle 708 on Inquiry Card—Page 219



TOUSEY

CASTING SEALERS

In addition to supplying a base for finishing coats, Tousey Sealers give protection against abuse from heat, rust, vibration and extreme temperature changes.

Tousey Sealers allow machining without chipping or flaking from edges. They effectively seal slight imperfections in a casting, and resist alkali washing solutions.

Tousey makes several casting sealers which are used in a variety of applications, adding years of wear and usefulness to product.

If your problem is one where a casting sealer is concerned, write Tousey today.

- AUTOMATIC TRANSMISSION CASES
- MOTOR BLOCKS
- WHEEL HOUSINGS
- AXLE HOUSINGS
- OIL PANS

TOUSEY PRODUCTS
CASTING SEALER

TOUSEY VARNISH CO.

520 West 25th Street • Chicago 16, Illinois

Foundry Statistics

ALUMINUM

(Shipments of castings—1000 pounds[1])

	Shipments				Unfilled Orders[2]
	Total	Sand	Perm. Mold	Die	
1954	624,973	158,473	214,408	245,291	.....
1955					
June	68,473	14,920	24,682	27,939	102,799
6 mo.	423,454	86,152	155,334	177,672	.....
July	55,033	11,716	21,006	21,656	101,024
Aug.	64,864	14,916	22,267	27,004	105,994
Sept.	67,069	14,769	23,075	28,532	111,696
Oct.	72,197	14,485	25,135	31,741	120,222
Nov.	75,065	14,327	26,267	33,852	126,954
Dec.	75,275	15,291	25,031	34,347	123,363
Total	832,957	171,656	298,115	354,804	.....
1956					
Jan.	74,152	15,861	24,528	33,253	121,924
Feb.	73,096	15,560	23,963	32,949	115,958
Mar.	73,785	16,597	22,816	33,965	110,642
Apr.	67,880	14,732	20,718	31,782	106,477
May	65,786	15,570	19,699	29,814	102,121
June	58,717	13,976	19,067	25,027	102,068
6 mo.	413,416	92,296	130,791	186,790	.....

MALLEABLE IRON

(Shipments of castings—net tons[1])

	Shipments		Standard		Pearlitic		Unfilled Orders[2]
	Total	For Sale	Total	For Sale	Total	For Sale	
1954	812,016	461,982	.....	.....	.....	.....	.....
1955							
May	98,397	57,317	.....	.....	.....	.....	106,446
5 mo.	469,994	271,498	.....	.....	.....	.....	.....
June	99,456	60,261	.....	.....	.....	.....	107,559
July	75,570	44,914	.....	.....	.....	.....	115,420
Aug.	82,448	48,126	.....	.....	.....	.....	123,473
Sept.	87,215	55,471	.....	.....	.....	.....	116,636
Oct.	90,866	53,804	.....	.....	.....	.....	121,261
Nov.	99,280	58,069	.....	.....	.....	.....	116,981
Dec.	99,946	60,409	.....	.....	.....	.....	123,107
Total	1,104,775	652,552	.....	.....	.....	.....	.....
1956							
Jan.	93,562	54,618	79,406	45,747	14,156	8,871	116,520
Feb.	93,533	54,466	80,601	47,606	12,932	6,860	113,616
Mar.	86,941	46,266	75,384	40,869	11,557	5,397	106,491
Apr.	83,320	47,064	72,763	41,449	10,557	5,615	99,573
May	80,138	51,053	69,593	44,424	10,545	6,629	93,677
5 mo.	437,494	253,467	377,747	220,095	59,747	33,372	.....

COPPER-BASE ALLOY

(Shipments of castings—1000 pounds[1])

	Shipments			Unfilled Orders[2]
	Total	Sand	Perm. Mold	
1954	835,930	753,179	48,848	.....
1955				
June	90,476	80,869	5,840	45,820
6 mo.	499,302	448,293	31,430	.....
July	65,816	59,138	3,998	48,085
Aug.	87,206	77,721	5,322	51,251
Sept.	89,600	80,481	5,603	57,313
Oct.	91,192	82,958	4,513	56,751
Nov.	90,345	80,934	5,807	57,049
Dec.	88,287	78,327	6,368	57,146
Total	1,011,748	907,852	82,201	.....
1956				
Jan.	89,767	80,116	6,135	58,445
Feb.	91,706	82,244	5,888	57,515
Mar.	96,085	85,094	6,299	65,560
Apr.	90,679	81,333	5,835	68,106
May	89,188	80,105	5,448	58,789
June	79,132	70,471	5,052	55,019
6 mo.	536,557	479,363	34,657	.....

MAGNESIUM

(Shipments of castings—1000 pounds[1])

	Shipments		Unfilled Orders[2]
	Total	For Sale	
1954	25,777	22,950	.....
1955			
June	2,367	2,098	6,346
6 mo.	14,436	13,064	.....
July	1,920	1,763	5,912
Aug.	2,176	2,002	5,964
Sept.	2,478	2,260	5,670
Oct.	2,302	2,077	5,394
Nov.	2,325	2,148	5,805
Dec.	2,255	2,018	5,981
Total	27,892	25,332	.....
1956			
Jan.	2,959	2,600	6,237
Feb.	2,977	2,720	6,704
Mar.	3,046	2,842	6,414
Apr.	3,140	2,949	7,137
May	3,021	2,801	7,293
June	2,949	2,765	7,850
6 mo.	18,092	16,677	.....

PRODUCTION WORKERS

Estimated Number

	May 1956	Apr. 1956	May 1955
Ferrous	205,400	211,100	201,700
Nonferrous	62,300	63,500	64,000
Average Weekly Earnings			
Gray Iron	82.82	85.07	85.77
Malleable Iron	81.20	83.23	87.47
Steel	96.32	95.22	86.74
Nonferrous	87.94	87.51	85.07
Average Weekly Hours			
Gray Iron	40.6	41.7	43.1
Malleable Iron	40.0	40.8	43.3
Steel	43.0	42.7	41.7
Nonferrous	40.9	40.7	40.9

Source: Bureau of Labor Statistics

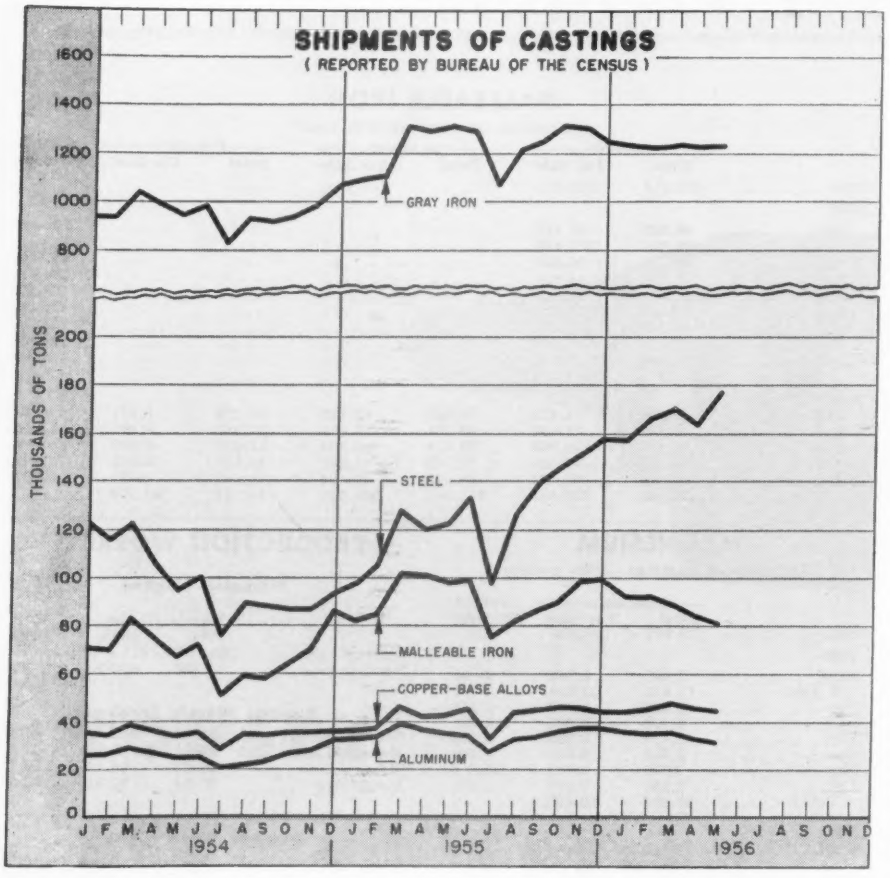
GRAY IRON CASTINGS—SHIPMENTS (Net Tons[1])

	All Castings		Miscellaneous Castings		Heavy Steel Ingot Molds		Chilled Railroad Car Wheels	Pressure Pipe & Fittings	Soil Pipe & Fittings	Unfilled Orders[2]
	Total	For Sale	Total	For Sale	Total	For Sale	Total	Total[3]	Total[3]	
1954	11,532,158	6,322,989	7,292,292	3,064,886	1,784,625	843,899	325,859	1,376,671	743,711	.....
1955										
May	1,310,424	707,105	803,897	315,072	227,236	117,915	35,966	168,772	74,553	937,949
5 mo.	6,117,108	3,217,029	3,904,044	1,542,569	1,049,173	532,887	161,297	640,312	362,282	.....
June	1,296,196	715,862	793,067	327,520	228,044	117,727	43,807	147,351	83,927	981,918
July	1,089,711	579,122	634,869	246,297	210,130	112,137	28,181	129,191	67,340	1,049,565
Aug.	1,226,312	688,317	718,423	301,502	238,007	121,071	29,298	156,074	84,510	1,160,466
Sept.	1,252,736	712,688	731,073	314,223	244,199	124,811	29,953	165,332	82,179	1,150,933
Oct.	1,310,309	713,671	795,875	327,827	245,749	122,722	31,877	160,875	75,923	1,113,336
Nov.	1,305,633	696,523	797,854	327,580	262,506	127,739	29,795	148,560	66,918	1,061,546
Dec.	1,259,740	663,993	786,480	328,445	262,056	133,115	30,833	133,935	46,436	1,075,477
Total	14,837,745	7,987,205	9,161,685	3,715,963	2,739,864	1,392,209	385,041	1,681,630	869,558	.....
1956										
Jan.	1,249,518	677,017	769,826	326,269	257,150	132,581	32,408	131,346	58,788	1,157,818
Feb.	1,214,769	680,494	739,786	322,956	242,207	128,643	35,074	133,254	64,448	1,140,765
Mar.	1,255,405	715,173	752,498	331,749	254,045	139,624	42,676	132,384	73,802	1,162,578
Apr.	1,218,000	702,145	719,109	314,968	237,486	130,473	39,325	151,670	70,410	1,144,870
May	1,247,761	749,681	702,239	321,288	243,719	131,294	38,544	171,859	91,400	1,086,122
5 mo.	6,185,453	3,524,510	3,683,458	1,617,230	1,233,607	662,615	188,027	720,513	358,848	.....

STEEL CASTINGS—SHIPMENTS (Net Tons[1])

	All Castings			Carbon			Alloy			Unfilled Orders[2]
	Total	For Sale	Railway Specialties	Total	For Sale	Railway Specialties	Total	For Sale	Railway Specialties	
1954	1,184,096	880,158	135,581	802,321	580,474	120,309	381,285	303,428	15,315	.....
1955										
May	122,465	92,713	16,810	85,950	63,182	15,335	36,515	29,531	1,475	225,302
5 mo.	574,746	439,649	83,105	401,080	299,269	76,528	177,040	140,380	6,577	.....
June	133,887	102,457	19,591	93,417	69,986	17,979	40,470	32,471	1,612	251,416
July	97,875	71,170	11,631	68,094	48,140	10,666	29,781	23,030	965	354,628
Aug.	126,406	96,290	20,576	91,245	68,514	19,094	35,161	27,776	1,482	413,531
Sept.	140,843	107,622	23,594	100,775	76,156	21,991	40,068	31,466	1,603	420,616
Oct.	145,674	110,409	23,745	105,345	79,235	22,375	40,329	31,831	1,370	418,063
Nov.	152,381	116,908	25,635	111,571	84,064	24,050	40,810	33,518	1,585	453,113
Dec.	158,982	122,201	29,003	116,872	88,894	26,919	42,110	33,307	2,084	475,335
Total	1,530,694	1,166,706	236,880	1,088,489	814,258	219,602	445,769	354,452	17,278	.....
1956										
Jan.	158,618	123,343	27,954	116,092	88,480	26,362	42,526	34,863	1,592	519,401
Feb.	165,398	128,598	30,833	123,279	94,998	29,112	42,119	33,600	1,721	567,330
Mar.	170,045	130,839	31,991	126,583	95,779	29,953	43,462	35,060	2,038	594,990
Apr.	163,708	125,015	27,475	121,723	91,332	25,302	41,985	33,683	2,173	600,242
May	178,227	142,025	35,949	134,919	107,575	73,880	43,308	30,984	2,254	608,275
5 mo.	835,996	649,820	154,202	622,596	478,164	184,609	213,400	168,190	9,778	.....

[1]Source: Bureau of Census. [2]For sale only. [3]All cast iron pipe is shipped for sale.


SHIPMENTS OF CASTINGS
(REPORTED BY BUREAU OF THE CENSUS)
THOUSANDS OF TONS
GRAY IRON
STEEL
MALLEABLE IRON
COPPER-BASE ALLOYS
ALUMINUM
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1954
1955
1956

COKE PRODUCTION AND CONSUMPTION

(Net tons*)

	Production	Consumption Total	Consumption By Foundries
1954	59,526,723	59,139,159	2,479,926
1955			
June	6,148,026	6,297,338	249,525
6 mo.	36,146,419	36,720,441	1,568,872
July	6,169,770	6,266,631	221,372
Aug.	6,395,422	6,439,101	249,425
Sept.	6,397,133	6,501,013	260,608
Oct.	6,630,609	6,813,118	283,818
Nov.	6,545,862	6,577,008	285,021
Dec.	6,865,032	6,949,073	284,936
Total	75,150,247	76,266,385	3,154,052
1956			
Jan.	6,914,836	6,182,704	275,660
Feb.	6,476,135	6,506,044	260,949
Mar.	6,896,593	6,861,698	267,414
Apr.	6,633,363	6,572,836	247,664
May	6,725,396	6,587,030	241,558
June	6,310,121	6,196,265	214,508
6 mo.	39,956,444	37,906,577	1,507,753

INGOT BRASS AND BRONZE

(Shipments in net tons)

	1955	1956
Jan.	25,201	27,736
Feb.	25,349	24,949
Mar.	29,713	28,310
Apr.	27,641	25,808
May	23,708	23,437
June	23,141	18,842
July	18,513	17,364
Aug.	27,013	.....
Sept.	26,349	.....
Oct.	25,228	.....
Nov.	25,102	.....
Dec.	21,448	.....
Total for year	298,406	166,466

Source: Defense Council of the Ingot Brass and Bronze Industry

ZINC-BASE ALLOY

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Shipments—For Sale	Unfilled Orders[2]
1954	520,501	322,845	.....
1955			
June	66,569	42,753	71,344
6 mo.	390,881	241,767	.....
July	47,928	27,429	68,927
Aug.	62,677	61,957	75,592
Sept.	62,030	43,498	80,660
Oct.	71,689	46,581	85,489
Nov.	75,099	47,572	93,001
Dec.	70,950	47,547	86,120
Total	781,254	516,351	.....
1956			
Jan.	68,050	43,750	83,234
Feb.	66,854	42,300	76,283
Mar.	65,760	42,806	73,025
Apr.	58,274	37,518	71,730
May	52,205	33,920	60,634
June	47,779	31,987	61,811
6 mo.	358,922	232,281	.....

INDEX OF FOUNDRY EQUIPMENT ORDERS

Foundry Trades Only

(Net Orders Closed, New Equipment)

	1955	1956
Jan.	81.0	195.6
Feb.	90.4	169.0
Mar.	163.6	152.7
Apr.	178.6	135.2
May	145.7	207.0
June	186.8	156.7
July	213.4	110.3
Aug.	134.0	....
Sept.	156.7	....
Oct.	108.6	....
Nov.	154.4	....
Dec.	183.9	....

Note: Figures are percentages of the base period 1947-49 taken as 100 per cent monthly average). This is a new base period. Source: Foundry Equipment Manufacturers Association.

IRON AND STEEL SCRAP CONSUMPTION

(Gross tons*)

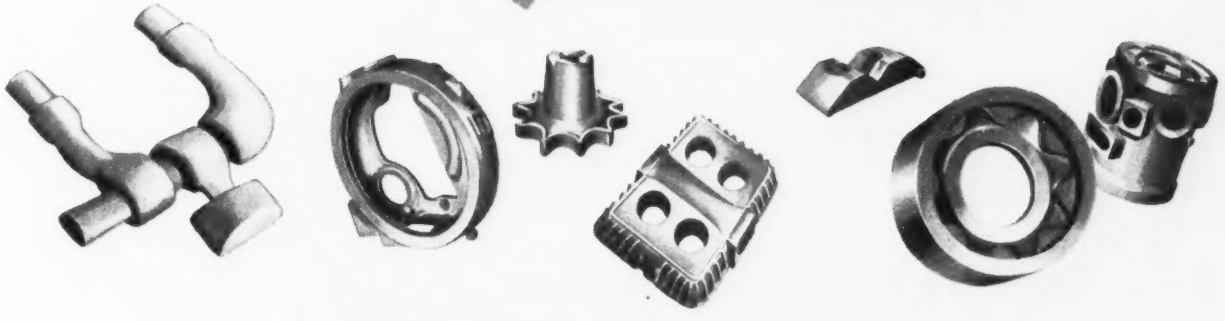
	All Scrap Total	By Types of Furnace—Cupola Total	By Types of Furnace—Air Total	By Types of Furnace—Electric Total
1954	54,780,758	8,542,581	855,207	6,100,444
1955				
May	6,415,947	963,082	109,074	745,060
5 mo.	29,735,204	4,569,246	513,775	3,390,719
June	6,117,573	928,908	116,419	733,573
July	5,447,130	730,735	81,216	623,623
Aug.	5,913,031	868,644	101,607	765,343
Sept.	6,060,491	881,158	119,550	753,318
Oct.	6,443,349	944,685	113,411	820,642
Nov.	6,441,351	952,906	112,056	839,971
Dec.	6,496,796	910,675	115,436	830,404
Total	72,654,925	10,786,957	1,273,470	8,757,593
1956				
Jan.	6,688,977	909,201	114,378	880,980
Feb.	6,345,421	892,373	116,418	833,661
Mar.	6,733,076	923,912	101,087	863,950
Apr.	6,490,680	862,233	96,514	842,216
May	6,491,567	855,007	104,485	899,967
5 mo.	32,749,721	4,442,726	532,882	4,320,774

PIG IRON PRODUCTION AND CONSUMPTION

	Production**—Total	Production**—Foundry	Production**—Malleable	Production**—Basic	Production**—Low Phos. Intermediate Low Phos. & Bessemer	Consumption*—Total	Consumption*—Cupola	Consumption*—Air	Consumption*—Electric
	(Standard grades—net tons)					(By type of furnace—gross tons)			
1954	58,113,924	2,241,436	2,798,646	47,485,047	5,587,465	52,373,541	4,364,418	215,158	155,258
1955									
June	6,494,838	238,412	347,631	5,245,861	662,934	5,774,896	454,751	22,871	21,697
6 mo.	37,108,892	1,370,055	1,880,087	30,067,737	3,801,013	32,543,538	2,693,178	129,371	113,187
July	6,329,393	233,235	344,365	5,116,960	634,833	5,430,550	361,171	16,483	19,535
Aug.	6,529,580	251,459	319,951	5,214,901	743,269	5,769,689	442,532	22,014	25,685
Sept.	6,653,578	252,630	343,919	5,397,134	659,895	5,903,190	445,099	23,340	24,552
Oct.	6,905,280	267,405	315,045	5,647,527	675,303	6,193,512	470,610	22,659	23,328
Nov.	6,636,649	241,727	353,713	5,404,584	636,625	5,973,223	469,485	22,621	18,148
Dec.	6,887,667	242,446	329,607	5,660,307	655,307	6,131,680	444,459	23,520	21,971
Total	77,114,073	2,858,957	3,884,971	62,570,394	7,799,751	68,944,698	5,326,534	260,008	246,406
1956									
Jan.	6,985,945	210,755	317,216	5,806,140	651,774	6,275,224	441,634	24,062	11,766
Feb.	6,539,199	229,440	370,208	5,350,650	588,901	5,871,824	430,792	24,307	13,010
Mar.	7,083,877	196,533	352,856	5,843,852	690,636	6,316,836	427,177	23,737	18,725
Apr.	6,860,833	210,319	333,660	5,623,647	693,207	6,077,074	413,537	22,757	17,179
May	6,873,102	232,375	329,750	5,625,067	685,910	6,064,632	413,494	24,074	28,596
June	6,387,608	213,769	331,871	5,227,488	614,480	.....	.....	.....	.....
6 mo.	40,730,564	1,293,191	2,035,621	33,476,844	3,924,908	.....	.....	.....	.....

*Source: U. S. Dept. of Interior. Bureau of Mines. **Source: American Iron & Steel Institute. [1]Source: Bureau of the Census. [2]For sale only.

WHAT'S YOUR Sand Recipe FOR MOLDS?



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PLANTS LOCATED IN
OTTAWA, ILL. AND ROCKWOOD, MICH.

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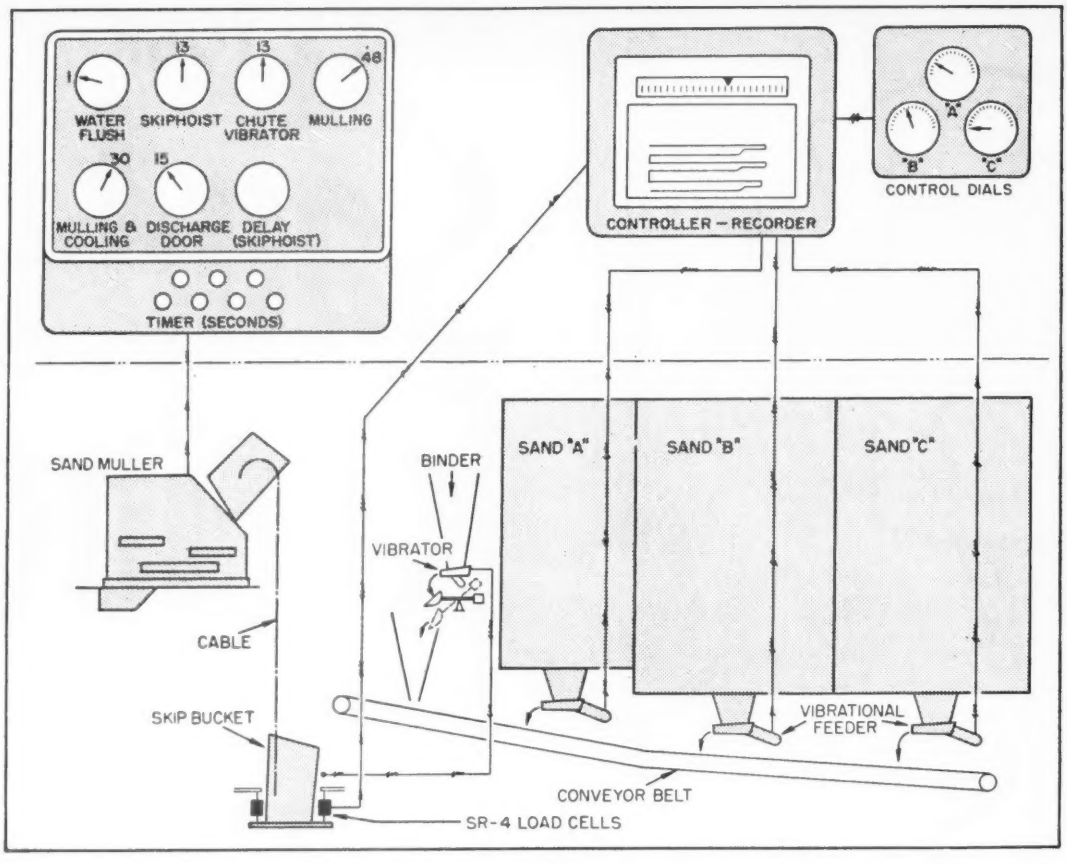


Diagram shows operation of mold sand handling and proportioning system. Control dials at upper right adjust quantities of sand released by vibrating feeders. The muller timing system at top left closes switch to lift and empty the skip bucket

Steel Foundry Employs Automatic

SAND PREPARATION

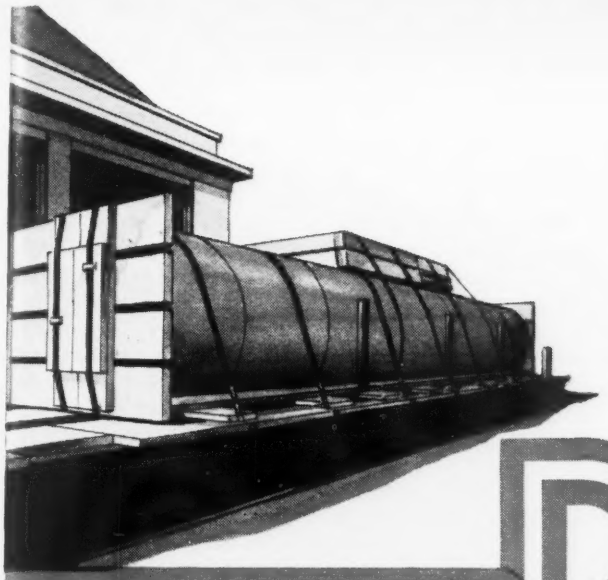
COMPLETE automation in large-scale preparation of molding sands for producing large steel castings has been achieved in the Granite City plant of General Steel Castings Corp., where unassisted instrumentation maintains continuous, automatic repetition of two-minute cycles. During these cycles, predetermined weights of two or three different types of sand and binder are delivered by conveyor belt to a skip bucket; the skip bucket is elevated, dumped into a sand muller and returned to the weighing scale; and the muller is automatically timed through a sequence of operations and emptied. Simultaneous operation of muller and sand proportioning equipment speed up production of molding sand, which is delivered in batches of 1400 to 2000 lb.

Although six systems for automatically proportioning molding sands by weight have been in operation in the plant for more than four years, recent addition of a batch timer gives complete automation characteristics to preparation of the sand. Automatic weighing and handling was made possible by Baldwin-Lima-Hamilton SR-4 load cells. Three of these cells of 2000-lb capacity each are the weight sensitive elements of electric scales for each of the six skip buckets in the system. Cycling of sand feeders is under the control of a strip chart recorder-controller.

Operation of the automatic sand-handling and mulling system can be followed in the accompanying diagram. Vibrational feeders under storage bins of sands "A," "B" and "C" are operated by the controller-recorder when a switch is operated by the skip bucket on return to its filling position. Sand "A" is fed onto the belt until a skip bucket weight signal from the SR-4 cells to the controller stops the feeder. The feeder for sand "B" then is started and delivers sand until the bucket weight reaches a value that causes the controller to break the electric power circuit to its feeder motor. If a third sand is required, this procedure is repeated for sand "C." The amounts of each sand fed to the conveyor belt are regulated by three control dials on the panel board which can be set in 20-lb increments to 3000 lb.

The bonding material vibrator also is started by the returning bucket when it closes a switch. When enough material has been vibrated, the hopper tips and discharges its material onto the belt. The tipping operation opens a limit switch and stops the vibrator. To assure discharge of all material, a standard door closer is used to delay return of the hopper. Quantity of binder is controlled by hopper counterweight position. Each muller is arranged for three different binders.

Mullers are operated through a two-minute cycle by six consecutive



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Great Lakes Carbon Corporation

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timers. Water is introduced into a muller first, then weighed sand ingredients are lifted and emptied, the skip bucket returning automatically under the control of limit switches. Sand, binder and water are mulled for a predetermined time to develop the sand characteristics required. Prepared sand is discharged onto belt conveyors for distribution to various molding centers. After a muller has emptied, the controller resets itself and repeats the two-minute operation cycle. During the mulling cycle, the skip bucket refills and is ready with the next batch before the muller has been emptied.

Several interlocks in the system assure proper operation. The skip bucket can be lifted only if the SR-4 load cells give an indication that the full weight of sand is in the bucket. If more than 30 lb of sand remain in the bucket after it has been dumped in the muller, the refilling cycle will not begin again. If the sand supply in any storage bin is insufficient for the mix, the bucket filling cycle is stopped. A limit switch on one side of the bucket prevents start of the filling cycle until the bucket is in place.

The automatic weighing operation is possible because load cells are not affected by dust, spilled sand or even moisture. The load-sensitive resistance wire strain gages in the cells are protected by a sealed container. The cells are small, and deflection under maximum load is imperceptible to the eye. They are used in tension and are protected against accidental impact overloads from the falling bucket by springs and oak shear pins in the platform suspensions. The recorder can be adjusted easily to show only the weight of the sand without the bucket weight.

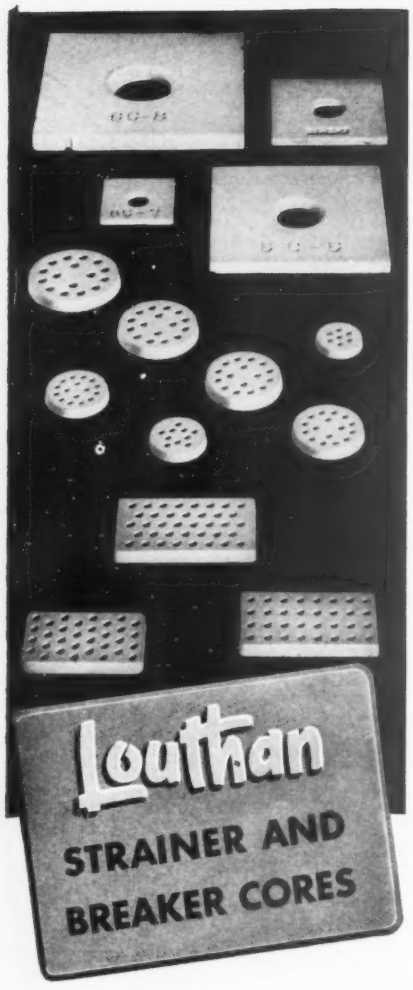
The strip chart record provides a continuous check on accuracy of sand proportions, thus assuring the accuracy and reproducibility essential in producing high-quality steel castings. Use of the method has increased the speed of production of

TEXAS STEEL FOUNDRY TEACHES SAFE LIVING

GOOD safety programs don't just happen: They must be created. And one of the impressive aspects of such a program is the way it makes safety and courtesy a normal way of life —almost reflex actions. East Texas Steel Castings Co., Longview, Tex., has such a program. Its effectiveness is demonstrated by the sign in the illustration above. The company completed 208 days without a lost-time accident as of July 16, 1956. And an incident involving one of its employees shows how deeply safety consciousness becomes ingrained in such circumstances.

On May 11, 1956, A. D. Truitt was driving a company truck on U. S. Highway 59, 19 miles south of Nacogdoches, Tex., when he arrived at the scene of a drowning near the Angelina River bridge. Noting that the highway patrolmen had their hands full with the accident, he properly parked his truck safely and helped to direct traffic and to keep vehicles from blocking the bridge. In addition, he assisted people connected with the drowned man in getting the victim's boat and boat trailer mounted and offered the use of his truck to get the boat and trailer out of the ditch they were in.

For his fast, efficient action in the interest of safety and courtesy, Mr. Truitt was presented the Knights of the Road Award—a citation made by Hobbs Trailer Co., the Texas Department of Public Safety and the Texas Safety Association to Texas truck drivers for outstanding acts of courtesy. In the view above, taken at a safety meeting at East Texas Steel Castings Co., at which the award was presented, Mr. Truitt is fourth from the left.



For closer control of molten metal

Louthan Refractory Strainer Cores will not chip, spall or erode, even at temperatures as high as 3,000° F. Dimensionally accurate, they give you uniform casting rates. They keep slag and core-sand inclusions out of castings—save you needless grinding and rejects. Try them! Complete range of standard sizes. Special sizes to order.

Louthan Refractory Breaker Core Shapes generate no core gas when exposed to heat of molten metal. They are smooth, strong, resist breakage. Try them! Complete range of standard sizes. Special sizes to order.

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molding sand and improved consistency of its physical properties. Weight accuracy has been within 1 per cent for batches up to 2000 lb, regardless of moisture content, height of sand in the bin or cleanliness of the conveyor.

Specification Covers Welding Of Numerous Cast Irons

The first specification covering filler metals suitable for welding gray iron, malleable iron and some alloy cast irons has been issued by the American Welding Society and the American Society for Testing Materials. Designated AWS A5.15 and ASTM A398, it deals with 16 classifications of filler metal, including cast iron, copper-base, nickel-base and mild-steel electrodes for shielded metal-arc welding. Also included are cast iron and copper-base welding rods for oxyacetylene and carbon-arc welding.

An appendix helps users to select the most suitable filler metal for their needs. It tells how to prepare cast iron for welding and gives information on preheat requirements, welding technique, etc. Data on postweld heat treatments and descriptions of the effects of welding on cast iron also are included. Copies can be obtained at 40 cents each from AWS, 33 East 39th St., New York 18, N. Y., or from ASTM, 1916 Race St., Philadelphia 3, Pa.

National Lead Co. Grants Ten Engineering Scholarships

Ten students attending Toledo University, Toledo, O., have won National Lead Co. scholarships in engineering. Under the same program, four other scholarships recently were granted to graduating high school seniors.

The scholarship program is designed to help meet a critical shortage of trained manpower in the fields of chemical, electrical and mechanical engineering and engineering physics. Doehler-Jarvis Division of National Lead administers the selection of recipients and awarding of scholarships, which run from one semester to three years.

Winners are offered part-time work during the summer at Doehler-Jarvis plants in Toledo, Pottstown, Pa., Grand Rapids, Mich., and Batavia, N. Y. The company manufactures die castings in zinc, aluminum, brass and magnesium for a wide variety of end products.

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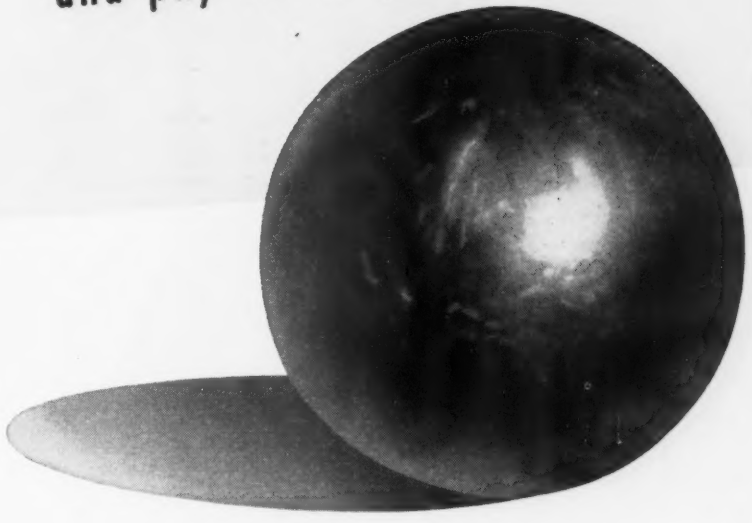
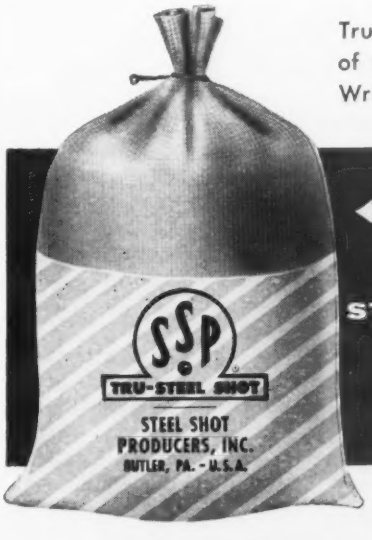
consistently-from one lot to the next-has everything you expect and pay for in premium shot



When you pay for premium material you expect premium performance—consistently. In TRU-STEEL **you get it**—consistently. Precision control of manufacturing processes, unsurpassed plant facilities, and the know-how of specialists whose only business is the manufacture of steel shot,—**assure it.** Tru-Steel is consistently round and solid, without hollow or stringy shot that reduce life cycle. Tru-Steel has the consistent hardness and chemistry from lot to lot that eliminates monthly variation in blasting costs. And,—it's superlatively graded; no other can match its uniformity.

Tru-Steel sells and stays sold on the basis of test and comparison with any other. Write us.



NOW IN 50-POUND BAGS

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STEEL SHOT PRODUCERS, Inc.

Butler, Pa.

Subsidiary of Pittsburgh Crushed Steel Co.
Pittsburgh 1, Pa.

Sold and recommended by
Pangborn Corporation, Hagerstown, Md.

Circle 713 on Inquiry Card—Page 219

Foundry Group Meetings

OREGON: Officers of the AFS chapter and the Oregon State College chapters met recently and posed for these photographs. At left, left to right, are student chapter officers Thomas Hamm, secretary; Gerry Reynolds, chairman; Palmer Byrkit, vice chairman and Bruce D. Hahn, treasurer. Oregon chapter officers, seated, left to right, are Robert M. Burns, Pacific Chain & Mfg. Co., treasurer; Harry K. McAllister, Western Foundry Co., vice chairman; Fred M. Menzel, Rich Mfg. Co., chairman, and Joe W. Goehler, Central Brass & Iron Foundry, secretary. Standing, left to right: James W. Smith, Holt Mfg. Co.; Allen C. Sears, Crawford & Doherty Foundry Co., Harry Czyzewski, Metallurgical Engineers Inc.; John F. Oettinger and Norman E. Hall, Electric Steel Casting Co. All these men are directors of the chapter Directors. Carl G. Mattson, Dependable Pattern Works and O. W. Kramer, Columbia Steel Casting Co., were not present. Other officials include the various committee chairmen. Publicity chairman is Bill Walkins, Electric Steel Casting Co. Membership chairman is Wiliam R. Reilly, Federated Metals Co. Education chairman is C. W. Taber, American Brake Shoe Co.

Chicago: The annual stag and golf outing of the AFS chapter attracted 520 members and guests to the Lincolnshire Country Club, Crete Township, Ill., on Aug. 11. Showers held off until midevening and did not interfere with some 300 golfers and horseshoepitching artists.

The annual weight guessing contest was conducted throughout the day, and Casmir Puplaski of Kensington Steel Co. was declared the winner with an estimate of the weight of six castings only 1 ounce over the actual figure of 112 lb 2 oz. The castings included one each of carbon steel, Hadfield manganese steel, brass, bronze, aluminum and magnesium.

Following dinner, prizes to golf and horseshoe winners and an assortment of door prizes were distributed from an outdoor stage. The program concluded with several floor show acts.

The outing was arranged and directed by the chapter's entertainment committee co-chairmanned by John C. Mulholland, Pettibone Mulliken Corp., and David Matter, Manufacturing Research, International Harvester Co.

Members of the committee included George Bowdish, Hill & Griffith Co.; A. A. Milkie, Pangborn Corp.; Frank Yrigoyen, Howard Foundry Co.; R. W. Meloy, Link-Belt Co.; Jack Absalom, American Steel Foundries; Charles J. McCurdy, Miller & Co.; J. C. Becker, Hewitt-Robins Inc.; and John Brandt, Swan-Finch Oil Corp.—*Erle F. Ross.*

Foundry Equipment: Thirty-eighth annual meeting of the Foundry Equipment Manufacturers Association will be held at the Greenbrier, White Sulphur Springs, W. Va., Oct. 18-20. Individual meetings of the association's various product groups are scheduled for the first day, with general sessions planned for the remaining two days.

Annual business meeting will be held Friday morning, presided over by FEMA president D. E. Davidson, Link-Belt Co., Chicago. A discussion of the association's statistical reports will be presented at this session by Einar A. Borch, National Metal Abrasives Co., Cleveland. He also will discuss business conditions in the foundry equipment industry at the following day's session.

Featured speaker at this latter session will be W. Rex Jennings, foundry superintendent, John Deere Waterloo Tractor Works, Waterloo, Iowa. He will speak on "What the Foundry Industry Expects of the Equipment Manufacturers."

Annual FEMA banquet Friday evening will have H. E. Helling Jr., Mathews Conveyer Co., Ellwood City, Pa., as master of ceremonies.

Philadelphia: Four hundred members and guests of the AFS chapter braved a constant rain to attend the annual summer outing at Manufacturer's Golf and Country, Oreland, Pa., on July 20. Golf, horse shoe pitching and the perennial softball battle between suppliers and foundrymen were high lights of the program. Prizes were awarded to winners in the athletic events. Co-chairmen for the affair were Louis Dill, George F. Pettinos Co., and William Gallano, E. J. Lavino Co.—*E. C. Klank, Philadelphia Coke Co.*

Connecticut Non-Ferrous: The Connecticut Non-Ferrous Foundrymen's Association met at Quinnipiack Club, New Haven, Conn., on May 16 and had a lively discussion of papers, equipment, AFS brass and bronze luncheon topics, pattern design, sand sessions and shop courses and other items of interest from the AFS convention held in Atlantic City the week previous.

James J. Shannon, metallurgist, Jenkins Bros., Bridgeport, Conn., reported on his observations of the

an ACCO product

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NEW!
Shaped Section Master Link
Holds its form under loads up to 18% greater.
NEW!
Accoloy X-Weld 125 Chain
Welds as strong or stronger than alloy material. Welded area 2¼ times conventional size area.

New X-weld Chains and New Master Links make ACCO *Registered* Sling Chains better, safer than ever!

• Now, you get even better quality, greater strength and an extra bonus of added safety when you buy ACCO *Registered* Sling Chains. For these famous slings embody two exclusive major improvements.

First, they are made with ACCO's great new Accoloy X-weld 125 Chain, hailed as the greatest triumph in chain manufacture since the advent of electrically welded chain. These chains have *unequalled strength at the welds*, and do not kink, thanks to the full alloy strength lugs and king-size welded areas.

Second, these slings incorporate ACCO's new Shaped Section Master Link which, though weighing no more than the standard round section link, holds its form under loads up to 18% greater.

ACCO *Registered* Sling Chains—the standard by which all other sling chains are judged—are on all counts the finest sling chains you can buy. They will serve you long and well. Buy them the next time you are in the market for slings. Call your ACCO *Registered* Sling Chain Distributor for details—or write to our nearest District Office.

WHAT "ACCO REGISTERED" MEANS

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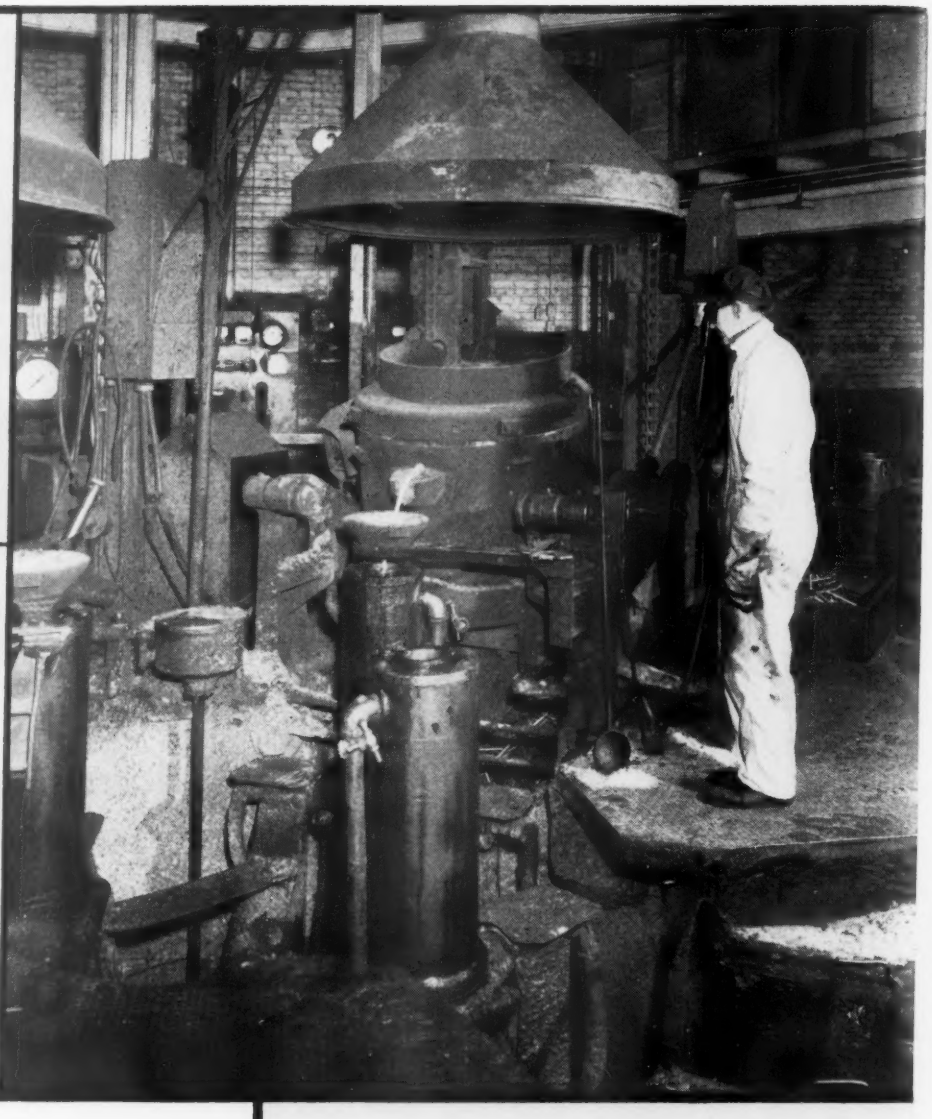
Again . . . Norton refractories make good on a tough job

Wolverine Tube Casting Shop selects engineered and prescribed ALUNDUM cement linings for around-the-clock melting service



One of the Ajax-Wyatt Furnaces at Wolverine Tube, Division of Calumet and Hecla, Inc., Detroit, Mich. Furnaces are low frequency induction type, 2,000 lbs. capacity, melting straight copper as the first stage in manufacturing copper condenser refrigeration and other tubular products. Pouring is at 2150°F into the three 300-lb. billet molds on the rotating table in foreground. After a mold is filled and the billet set, the mold drops forward and releases the billet to rollers at bottom right. Operation is around the clock, six days per week, averaging five 900-lb. pours each eight-hour shift. Norton ALUNDUM refractory cement linings on this almost continuous service are giving excellent results.

Norton refractory cements are *engineered and prescribed* for longer, lower cost service across the entire range of furnace applications.

Whatever your own metal-melting problems may be, take advantage of Norton technicians' expert aid. Working with ALUNDUM*, CRYSTOLON*, MAGNORITE and FUSED STABILIZED ZIRCONIA refractory materials they will help you find the exact R's you need for more melts per lining and per furnace-hour. For details see your Norton Refractories Engineer. Or write to NORTON COMPANY, Refractories Division, 309 New Bond St., Worcester 6, Mass. *In Canada:* A. P. Green Fire Brick Co., Ltd., Toronto, Ont.

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NORTON PRODUCTS: Abrasives • Grinding Wheels
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equipment on display at the convention. Many improvements and refinements for increased production were evident, he said.

Richard Porter, General Dynamics Corp., Groton, Conn., discussed briefly two technical papers presented at the convention: "Application of Radiography in the Manufacture of Bronze Castings" by N. A. Kahn, S. Goldspiel and R. R. Waltien, New York Naval Shipyard, Brooklyn, N. Y. and "Fluxing and Deoxidation Treatment for Copper" by G. Neu and J. E. Gotheridge, Foundry Services Co., Columbus, O.—*Frank B. Diana.*

National Founders: Many of the problems confronting foundry management will be discussed at the 58th annual meeting of the National Foundry Association, to be held at the Sheraton-Cadillac Hotel, Detroit, Thursday and Friday, Oct. 11-12.

Among the principal subjects to be presented are:

"A United Labor Front (The AFL-CIO Merger) Requires a Strong, United Foundry Front," by Arthur G. Hall, vice president, NFA, and works manager, Nordberg Mfg. Co., Milwaukee.

"Developing Effective Employee Communcations," by Dr. Paul Mundie, industrial consulting psychologist with Humber, Mundie & McClary, Milwaukee.

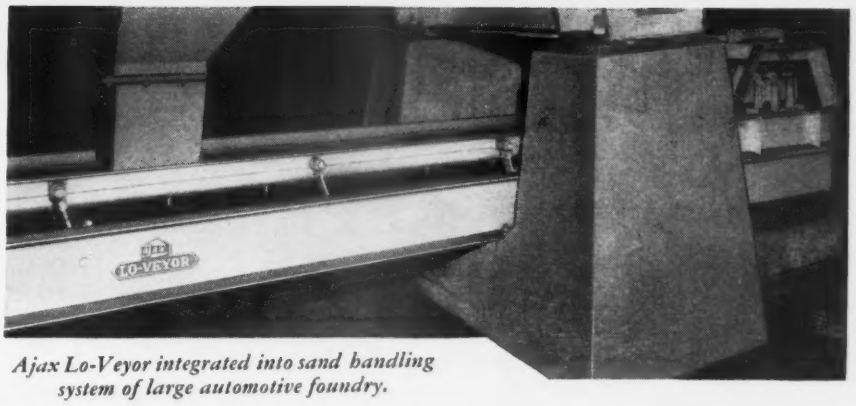
"The Steward-Foreman Relationship," by a panel which will include N. T. Booth Jr., Deemer Steel Castings Co. New Castle, Del.; Richard Jackson, Jackson Industries Inc., Birmingham; E. S. Mathiesen, Cutler-Hammer Inc., Milwaukee, and two other representatives of foundry management. Ray F. Heiden, Galva Foundry Co., Galva, Ill., will be moderator.

"For Smoother Bargaining," by Frank Voit, vice president IMFW (AFL-CIO); Joseph McCusker, regional director, UAW (AFL-CIO); W. M. Bucher, vice president and general manager, Swayne-Robinson & Co., Richmond, Ind., and William Raven, vice president, Continental Motors Corp., Detroit. Albert Graf, vice president, the Cottrell Co., Westerly, R. I., will be moderator.

"The NFA Pension Trust Fund Program," by Joseph H. Daoust, Joseph H. Daoust & Associates.

Annual report of the association's president, Paul L. Arnold, resident manager, United States Pipe & Foundry Co., Chattanooga, Tenn., will be presented at the opening session of the meeting.

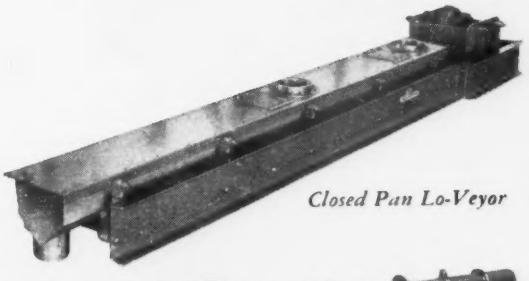
A special program of ladies entertainment also is being arranged for the occasion.



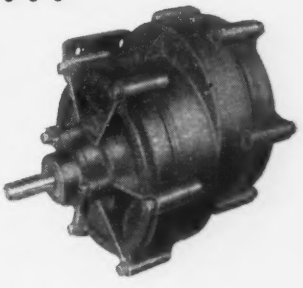
Ajax Lo-Veyor integrated into sand handling system of large automotive foundry.

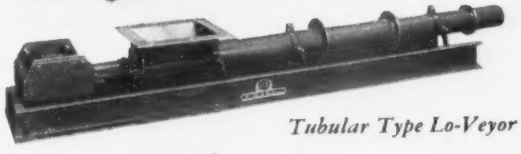
AJAX **LO-VEYORS**

convey bulk materials at low cost . . .



Closed Pan Lo-Veyor





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Ajax reciprocating drive, the heart of Ajax Vibrating Conveyors.

FAST: Ajax Lo-Veyors take the place of shovels, wheelbarrows and other slow-moving bulk materials handling methods. They handle large tonnage in sizes from 5 microns up to large lumps and materials of various moisture contents.

CAPACITIES: Made in lengths from 3 ft. up,—they are used as feeders and for long runs with units in series. They are often integrated and synchronized with production lines between departments and machines.

LOW HEAD ROOM: Space saving installations, under floors and overhead, are made easy by low height averaging less than 14″ except at point where shaker is located.

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ENGINEERING SERVICE: The broad experience of Ajax engineers is available to give you the latest thinking in handling bulk materials. An outline of your problem will bring you some worthwhile answers.

AJAX FLEXIBLE COUPLING CO. INC.

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Circle 716 on Inquiry Card—Page 219

LOOKING FOR FOUNDRY SAFETY APPAREL?

JAXCOLITE

Amazing new compound makes asbestos, duck and burlap garments extremely resistant to heat, molten metal splash, acids, caustics, oil and water. Long wearing and low cost. Users won't buy anything else. Nothing to compare with it. Available in coats, pants, aprons, sleeves, leggings, spats, hoods, etc.

HEAT REPELLENT ALUMINIZED ASBESTOS

Aluminized surface reflects up to 95% radiant heat. Asbestos body resists fire. Result is cool safe protection. Available in all body protection garments.

SPRING-TYPE LEGGINGS, AND APRONS

Spring-type Leggings made of chrome leather, flameproof duck or asbestos. Easy to put on and off. Air-pocket lining for comfort. Special close-fit collar. Tuck-in flaps protect back of legs. Many types of aprons available in all materials and styles. Tell us what you want.

LOOK TO *STEEL-GRIP* FOR BETTER PROTECTION AT LOWEST COST

Steel-Grip offers a complete line of safety apparel for every foundry need. Note especially the Steel-Grip designs in new materials extremely resistant to heat, molten metal splash, acids, caustics, abrasion and wear. Since 1910, quality manufacture from selected materials has been our standard practice. We offer correctly designed safeguards, in leather, duck, Perma-Proof materials, asbestos, wool, Dynel cloth, Jaxcolite-coated materials, aluminum-coated materials, etc. They give long wear, uniform dependability at the lowest man-hour costs . . . the real measure of value. Don't buy on appearances or first price. Buy safeguards like you would buy machines . . . on performance. Buy tested and proved Steel-Grip safeguards and watch your costs go down. Write today for complete catalog.

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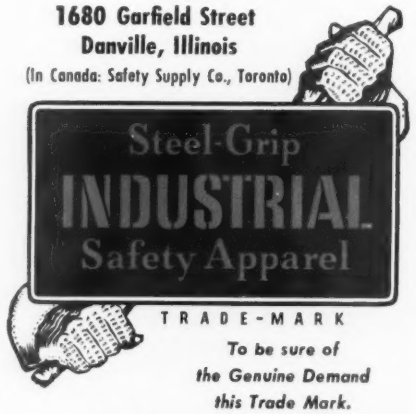

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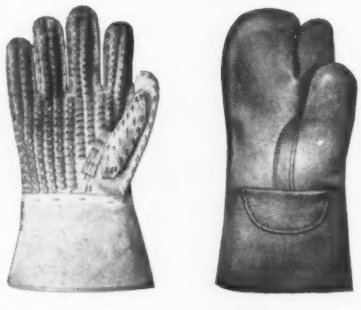
CERTIFIED ASBESTOS SAFEGUARDS

A Steel-Grip "first". Steel-Grip has own laboratory, tests all its raw materials. Our tests show following specifications give longest wear, greatest strength: Minimum of 83% asbestos, maximum of 17% long fiber cotton content. 20 warp ends per inch, 10 woof ends per inch. Minimum weight 2.47 lbs. per yard. Warp tensile strength min. 145 lbs. Woof tensile strength min. 65 lbs. Every Steel-Grip asbestos safeguard certified to you to meet or beat these specifications. Your guarantee. Demand this certified label. Coats, pants, gloves, mitts, etc.



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Finest quality chrome-tanned leather, in varying weights with varying degrees and styles of steel reinforcement, according to the conditions of the job. Afford the utmost in wear and abrasion resistance.

Circle 717 on Inquiry Card—Page 219

A Realistic Plan To End Tax Discrimination

How To Maintain Revenue With a Lower Top Rate

By Wm. J. Grede*

IT IS gradually being recognized throughout America that taxation by selective exemption or discrimination is the worst form of tax inequity.

The average American does not expect his tax load to be lightened by discriminatory taxes on others. He is more interested in getting ahead than pulling others down. This fair-minded attitude has shown through in numerous surveys of public opinion. A recent Gallup poll showed that 53 per cent of the public favors a 35 per cent limitation on income taxation. Only a little more than a third were opposed.

That's why I sincerely believe that *something can be done* about our present high and discriminatory tax structure. That's why I am directing this special plea to the fellow members of my own industry. I am asking for help in putting over a realistic and workable plan to ease discriminatory tax rates, a plan which would not shift the burden to any other group and which would not decrease the present level of federal revenue.

The five-year plan developed by the National Association of Manufacturers for the orderly reduction of income tax rates to a top of 35 per cent is gaining wider and wider acceptance throughout the country.

Here is the basis for the plan:

As the American economy expands, so does the amount of federal tax revenues from a given set of rates, but in greater proportion. Over many years, good and bad together, our economic growth has averaged out at approximately 3 per cent a year, measured by physical volume of goods and services. Assuming no more than such average growth, at the close of the next five-year period, revenue expansion is estimated at

*Mr. Grede is president of Grede Foundries Inc., which is comprised of six foundries, five in Wisconsin and one in Upper Michigan and employs a total of about 1000 persons. In 1952 he served as president of the National Association of Manufacturers and now is chairman of its finance committee.

more than $12 billion annually.

The proposal is that this revenue increase be first applied to moderating the discriminatory rates. The cost of the plan at the close of the five-year period would be about $10 billion annually, or $2 billion less than the minimum expected revenue growth.

Here's how the plan would work:

There would be five successive annual reductions of 16 per cent in the progressive part of each tax rate, with each reduction computed on the original progression—that part of the rate above 20 per cent. With the top rate, including the base rate, reduced to 35 per cent, the 50 per cent rate, for example, would be reduced to 26 per cent. In other words, every progressive taxpayer would receive the same percentage reduction in his unfair tax burden. With five uniform roll-backs in each super-rate, his tax bill from progression at the end of the period would be 80 per cent less than at the beginning.

The corporate tax now consists of a 30 per cent normal tax and a 22 per cent surtax, or a combined top rate of 52 per cent. Tax law now provides for a reduction of five percentage points in the normal tax.

The proposal is that this reduction be followed by four successive annual reductions of three percentage points each, or a total of 12 percentage points, to bring the combined top rate down to 35 per cent at the end of five years. The 12 percentage points would be divided equally between the normal and the surtax, so that the total reductions from present rates would be 11 percentage points in the normal tax and six percentage points in the surtax.

This plan adds up in the long run to *more* tax revenue for Uncle Sam. As national income grows, the base for federal taxes also increases—faster than economic growth itself.

It is my belief that no one, in truth—except the extreme socialist—has any grounds for saying that this five-year plan for tax reduction would not be politically acceptable as well as economically workable—because until now, no fight to accomplish reduction of discriminatory rates ever has been made.

This is an issue that has been defaulted year after year. But we are in the battle now. We have made progress, but we must make more.

On the side of tax fairness—which is the basic point at issue—there is the immense power of the American people's belief in fair play and individual rights and freedom.

It is our job to make this power effective. We must turn what I call "passive opposition"—which is not opposition at all, but mostly hesitancy, softness and compromise—into active support.

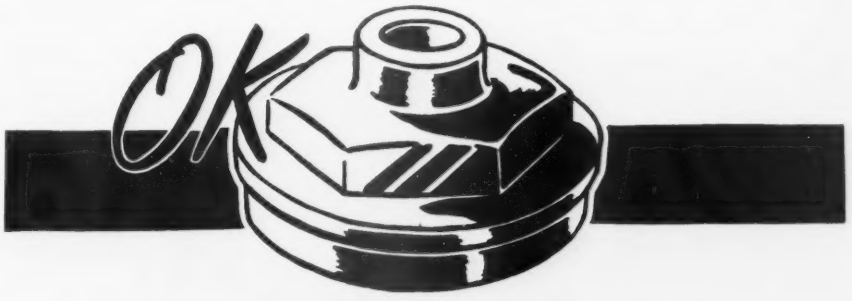
I hope the members of my own industry will join unanimously in the battle to ease a tax burden which not only discriminates against individuals, but also against economic growth, the nation's future prosperity, and our basic freedoms.

Readers who wish further information on this tax plan may write to Mr. Grede at Grede Foundries Inc., P. O. Box 443, Milwaukee, Wis., or to the Public Information Department, National Association of Manufacturers, Two East 48th St., New York 17, N. Y.

Issues Report on Coke Data

The Bureau of Mines, U. S. Department of the Interior, has published "Coke and Coal Chemicals," a chapter from Volume II of *Minerals Yearbook,* 1954, as a separate publication available for 20 cents from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

The booklet reports on a variety of information pertaining to production, value, etc., of coke and coal chemicals.



BETTER CASTINGS

Denser castings with a finer grain structure, and more easily machineable! Castings with better finish that require less cleaning! THESE are some of the advantages in the close control of pouring temperatures with Marshall Enclosed-Tip Thermocouples.

You want better castings, so use Marshall Thermocouples to measure the temperature of your metals in furnace or ladle. They do the job quickly and accurately. They tell just how hot your metals are. You pour at just the right heat.

Marshall Thermocouples are doing a good job day after day in nonferrous foundries everywhere. They're protected to stand the severe duty. They withstand many immersions.

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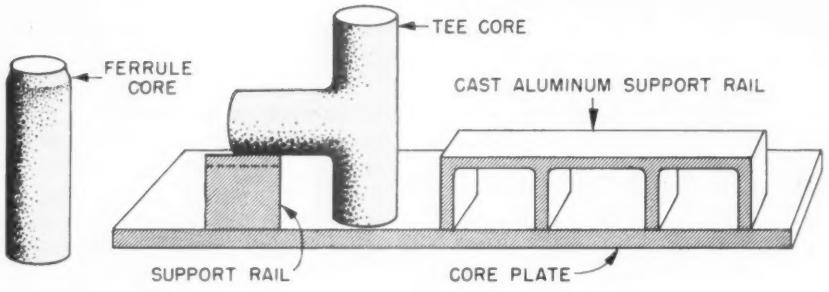
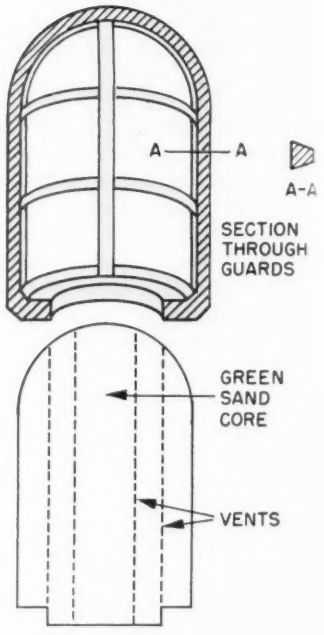
Circle 718 on Inquiry Card—Page 219

Trouble Shooting

By C. W. AMMEN





Drawings show how ferrule and tee cores are made. On right are a section through a light guard and a sketch indicating how green sand core is vented

Green Sand Cores

Dear Charlie:

When we make small, thin-cored castings, two factors give us trouble: Excessive core cost and hot tears. The items which give us the most trouble on both counts are cast brass marine light guards, brass ferrules and a little, thin-walled plumbing tee. Cores for ferrules and light guards are baked on end. Those for tees are blown and baked out in driers. Size and design of the light guards requires a large core and a lightweight casting, and hot tears are common—a little too much binder in the cores, and they blow up. When the cores are made with a small amount of binder, oven loss is high.

Sincerely,
Sam

Dear Sam:

Honestly, Sam, I just don't know what to think. What used to be common practice for jobs of this nature seems to have fallen by the wayside. Perhaps the older, cheaper and simpler methods are out of date. I make this remark for two reasons. First, I made cast marine light guards by the bucketful some time back, when I worked for J. P. On a recent visit to the old stamping ground, I was amazed to find that the place still was making light guards.

As you know, the place has changed since J. P. went to his reward. The new owners were kind enough to let me roam about the shop and gave me a real tour. I remarked to the new owner that at one time I used to put up an acre of boxes on light guards and that my back hasn't been the same since. He promptly unloaded on me as to his high cost and loss on the item due to hot tearing, window flash and high core cost.

My second reason concerns the ferrules. By golly, if I didn't find a joker, a fellow we both know, who knows how to make them, and for years has made them, who changed his way of living, got real fancy, ran into trouble and was too pigheaded to go back to the older method for fear of being accused of being old-fashioned, etc. So he was going to whip it or die trying! And now you. I am for progress, new developments, modernization, mechanization and all that goes with them, but let's not lose sight of the fact that some of the simple, basic methods still are good and have a place. A fellow once showed me a rig which he said would melt iron *almost* as cheaply and *almost* as simply as a cupola. Come up with a simpler and cheaper rig, instead, and you have done something!

Let's back down a bit. First, you can make the items of which you speak with dry sand cores. The proper mix, with a high collapsibility, will do the trick and is almost—but not quite—as cheap as green sand cores. Far too little use is made of green sand cores today, but when a job does lend itself to their use, they offer many advantages, such as low cost, less scrap, easy shakeout, etc. Light guards used to be made by this method in some shops and probably still are.

Use a split box open on the flat end. The box is rammed up with molding sand which is tempered a bit on the wet side, and a vent wire is used to poke several vents to within, say, ¼-in. of the closed, or dome-shaped, end. The cores are placed on plates with about 2 in. between cores and between rows. They then are run in an oven for 5 or 10 minutes—just long enough to get them good and hot.

When the cores are removed, spray them well all over with strong molasses water or sulphite liquor water. (Incidentally, some foundrymen prefer to spray them before they are dried.) When they are cold,

they have a dry crust and are easy to handle and to set. Ferrules are made in the same manner, stood on end. Tee cores for light plumbing ware are made in a full box, open on all ends to facilitate ramming. Remove them from the box by placing your first finger under the center leg to support it. Stand them on one end of the straight run, with the center legs resting on cast aluminum rails made up to the correct height. Place them about 2 in. apart to facilitate spraying. Some of these cores require a wire for support.

You will find that any number of cores can be made by this simple old method. Many cover cores can be made this way at a reduced cost. Some require simple arbors and rodding, but many can be made with existing equipment now being used to make dry oil sand cores.

I have seen difficult, costly cover cores, which caused excessive scrap because of their design, made in green sand in a special box into which a cast iron arbor was placed. The arbor supplied the necessary support during making, drying and the casting operation, like the arbors used to produce soil pipe fittings with green sand cores.

When it is at all possible, investigate the possibility of employing green sand cores, either dry or green. Sometimes the small cost of arbors, etc., is offset by savings. Of course, there also are many instances in which dry sand oil cores replace green sand cores to an advantage.

About your light guards—I am fairly sure that green sand cores made and treated as described offer not only the cheapest method, but, if done properly, will produce the highest percentage of good castings.

Sincerely,
Charlie

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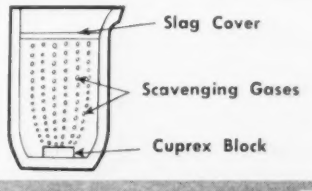

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You Can't Mass Produce A Good Safety Program

Causes of Unsafe Acts Often Are Individual

by Ernest W. Fair

THE TROUBLE with most safety programs is that plant executives seldom take the trouble to get to and to remove the cause of unsafe acts in their shops," a safety engineer stated recently. "Instead, they set up a series of standards and expect them to do the job. By themselves they seldom attain the desired results."

His remarks point up the basic necessity of finding every reason for unsafe acts in the foundry before formulating a program to eliminate them. Without an understanding of these conditions, it always is difficult to set up safety procedures that will be genuinely effective. Merely copying what proved useful in another shop is not likely to achieve the goal of 100 per cent safety.

Mechanical Factors—The problem of finding the reasons for unsafe acts in one's own shop begins with a study of the mechanical conditions which exist therein. Even the most safety-conscious employee will have accidents if he must work under bad conditions. This job is strictly a routine affair which should be conducted by someone able to recognize such situations.

With these data, the problem still is far from solved. The next task is to locate the reasons that permit unsafe acts. Bad conditions probably account for 10 per cent of the problem. Other causes are responsible for the remaining 90 per cent and therefore are worthy of considerable study.

Studies have been made which embrace every size and type of plant and shop operation. Here is a short list of the more important factors which the foundry executive should consider while seeking specific reasons for unsafe acts in his own foundry.

Employee Attitudes—Improper attitudes on the part of employees always head the list. This category includes willful disregard, recklessness, laziness, disloyalty, a lack of cooperation and many other personal attributes which lie directly at the cause of accidents. All are attitudes of mind which must be understood before an effective safety program can be organized. Failure to understand them means that the whole pro-

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gram can "go over the head" of the employees concerned. Whenever the cause of a given accident is sought, a search for any one of these conditions helps to provide a better understanding of the cause and makes it easier to devise a remedy applicable not only to employees as a whole, but to each individual.

Personnel adjustments are required as part of the safety program in handling any such conditions. Sometimes changing an individual's job can remove his accident potential. Many firms have found that a highly accident-prone individual working at a given job becomes entirely accident-free when placed on another. In rare cases, rigid discipline is necessary to handle such a situation. Occasionally medical or psychological approaches are needed.

Lack of Instruction — Lack of knowledge or skill is another important reason for unsafe acts in any foundry. In many cases, this situation exists simply because employees have been insufficiently informed about their jobs and the accident hazards involved. Where safety education in the foundry is spotty, this condition always exists. It also is prevalent where the firm seeks to accomplish the safety purpose with a generalized program that fails to reach the individual and his specific job problems. The remedies in such cases are obvious.

Misunderstandings also can cause accidents. In shops where final responsibility for safety education is placed on foremen or superintendents, they always should make certain that each safety regulation is understood accurately and thoroughly by individual employees. Failure to convince the individual employee of the need for caution also has been found to be a contributing cause.

"Big order in th' bag—and you, hafta drop the sample on his corns!"

For all these conditions, the remedy lies in instruction and re-instruction. Employees forget; they must be reminded continuously. Many surveys have pointed to lack of knowledge or skill as an important cause of unsafe acts in plants where safety is a once-a-year concern which is forgotten the rest of the time.

Safety education should be a continuing process in any foundry. Those plants which make it continuous always are the ones with lowest accident figures. This continuing responsibility rests not only with the individual foreman, but also with the executive department of the firm. Pressure on foremen always must come from top management.

Physical Disability—Physically unsuited individuals make up the third category in our list. Few foundries are without employees of this type, and they never have a real chance to be safe individuals at their jobs. Periodic medical examinations are used in many large plants as an approach to locating such individuals. The employee physically safe at the start of his employment offers no

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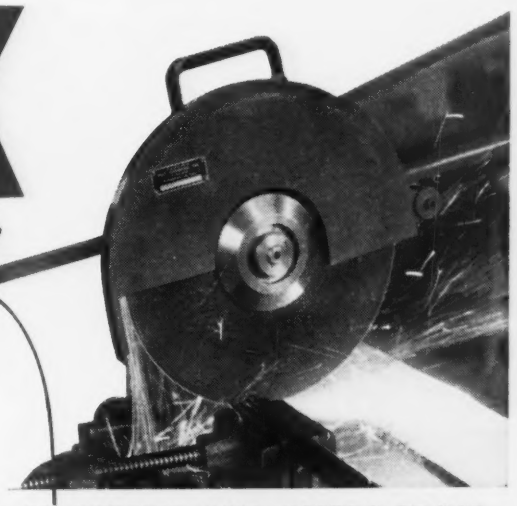

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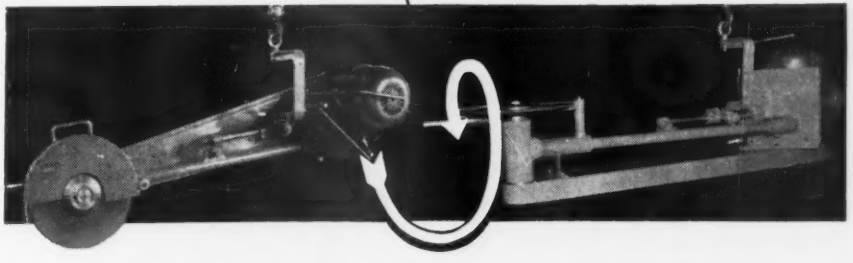

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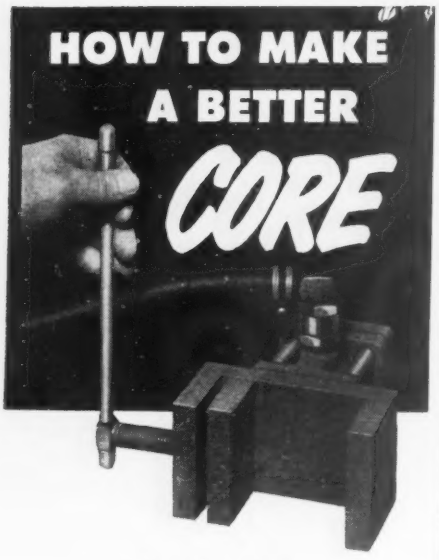

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guarantee that he will continue to be safe for years ahead; time has a way of decreasing the physical efficiency of all of us. Many handicapped employees are good, safe workers, their disabilities not being such as to be dangerous on their particular jobs.

Any checkup on this factor should consider hearing, sight, age, sex, height, acquired minor illness, acquired allergies, slowing down of reactions, acquired physical disabilities, alcoholism, increasing nervous tension and any other conditions which contribute to the lack of physical well being in the employee.

Physical Environment — Improper physical environment is an additional factor which should be examined in any study of reasons for unsafe acts. These also can change with time. Buildings and equipment age and deteriorate, just as individuals do.

A thorough examination of the space factor, for example, is desirable, but frequently is overlooked. For some reason this condition often is not considered during remodeling, redesign or installation of new equipment and accessories. An entirely safe working condition can be changed quickly to an unsafe one by crowding the space where an employee has to do his job.

Light and heat changes also can create conditions which lead to unsafe acts on the part of employees. A checkup should include a thorough examination of these conditions.

Materials, tools, equipment, procedures, company policy, etc.—all help to cause unsafe acts. Each should be considered at the time of every accident investigation.

The need for thorough investigation, often of a personal nature, is emphasized in the following examples of stated causes which were uncovered in a number of such studies. They show that the causes of unsafe acts can lie in very personal, individual and specific areas which may be ignored when we apply only general thinking.

Failure to wear safety glasses—"They are too uncomfortable."

Accident incurred by men running down stairways—"If we don't hurry, we miss a close connection for a streetcar or bus and have to wait a long time for another."

Accident caused by removal of machine guards—"I took them off because I was always uncomfortable working around the machine. It gave me more leg room when I took them off."

Accident caused by horseplay—"We were just having fun and never thought it would result in somebody getting hurt."

Accident caused by standing too

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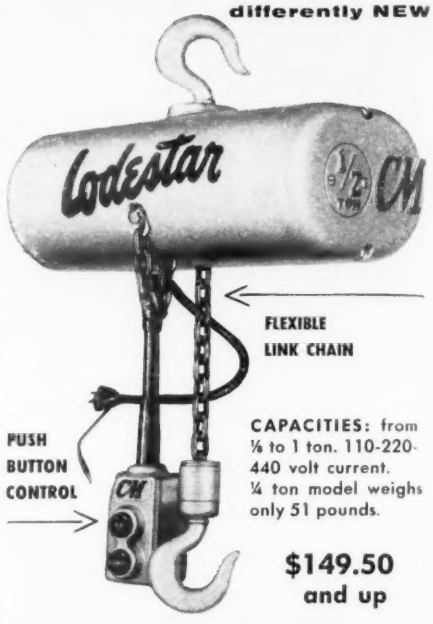

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close to machinery—"I hated to admit that my eyes were getting bad and didn't want to get glasses."

Those are just a few examples. A study of accident reports will lead to hundreds of others, similarly individual and specific to each case. They serve to emphasize the extreme importance of searching out all such cases of unsafe acts. When such causes are understood, regulations to prevent their repetition can be drafted more effectively.

Program Completed for Sixth Canadian Foundry Conference

The program for the sixth All-Canadian Foundry Conference has been completed. The conference, sponsored by the Eastern Canada, Ontario and British Columbia chapters, AFS, is scheduled for the Mount Royal Sheraton Hotel, Montreal, Quebec, Nov. 8-9.

Program details follow:

Thursday, Nov. 8

Morning—Registration and plant visitations.

Noon—Welcoming luncheon. Speaker: John Fisher.

Afternoon—Two technical sessions. "Plastics for the Foundry." Speaker: Walter E. Wenninga, president, Waldor Enterprises Ltd., Montreal. "Shrinkage Effects and Control in Cast Iron." Speaker: John Allan, St. Catherines Brass Works, St. Catherines, Ontario.

Evening—Film, "Mechanization in Small Foundries," through courtesy of the Beardsley & Piper Division, Pettibone Mulliken Corp., Chicago. I. H. Dennen, advertising manager, Beardsley & Piper, will present the film.

Friday, Nov. 9

Morning—Plant visitations.

Afternoon—"Nitches & Notches." Speaker: Everett Chapman, consulting engineer, West Chester, Pa. Talk will cover some effects of design and workmanship on stress distribution and endurance of metal structures.

Evening—Social hour, banquet and entertainment.

Book Reviews

Die Gegossenen Metallischen Werkstoffe (Cast Metallic Materials), by Erwin Knipp, cloth, 173 pages, 6¼ x 9 in., published by Giesserei-Verlag G.m.b.H., Breite Str. 27, Duesseldorf, Germany. Price 17.50 DM.

This German book consists of tables giving compositions, properties and applications of 472 cast metals and alloys commonly used in industry.

It was prepared to aid the designer and foundryman in selecting cast materials suitable for specific applications. Materials include gray and malleable iron, steel, nonferrous alloys and bearing metals.

The book essentially is divided into five sections. The first provides such information as classification by type composition, tradename, composition, specific gravity, castability, machinability, special properties, application, and relative cost.

The remaining sections give information on mechanical, physical, electrical and other properties of the materials.

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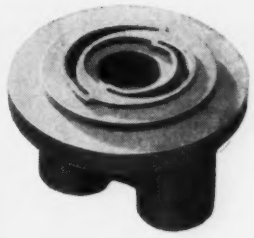

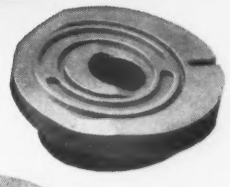

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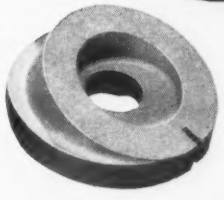

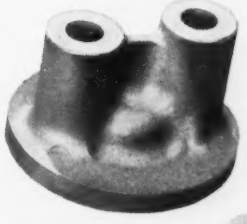

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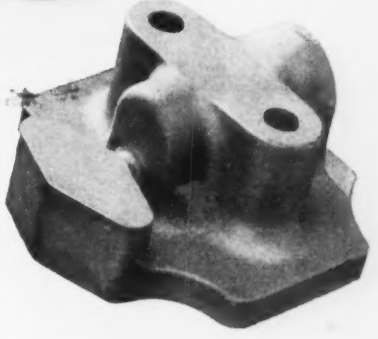

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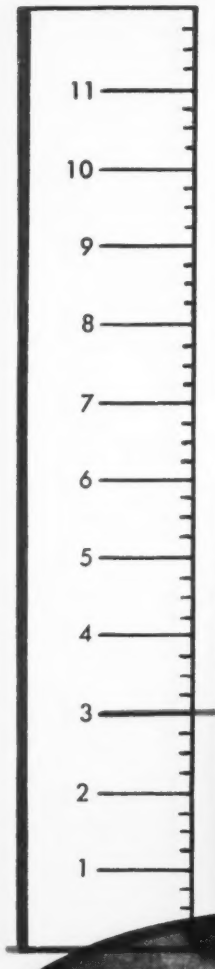

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Some Applications of Geometry In the Patternshop

From time to time the patternmaker has occasion to lay out various types of geometrical figures, and the following information will be of value in speeding the work. Fig. 1 is a heptagon or seven-sided figure whose angles at the center are 51° 25.8′. The angle formed by the adjacent sides at C equals 128° 34.2′. Multiplying the radius R by 0.8676—in column 5 of Table I will give the length of a side as at B in Fig. 1. Multiplying the length of a side D, Fig. 1, by 1.0383 in column 6 of Table I will give R in Fig. 1, and the angles to hold the work in cutting the ends of the segments under column 7 Table I is 64° 17.5′, and is shown in Fig. 2.

Referring to Table I, the 51° 25.8′ is obtained by dividing 360° by 7 which equals 51.43°. Since 0.43° equals 25.8′, the answer is as previously indicated, 51° 25.8′.

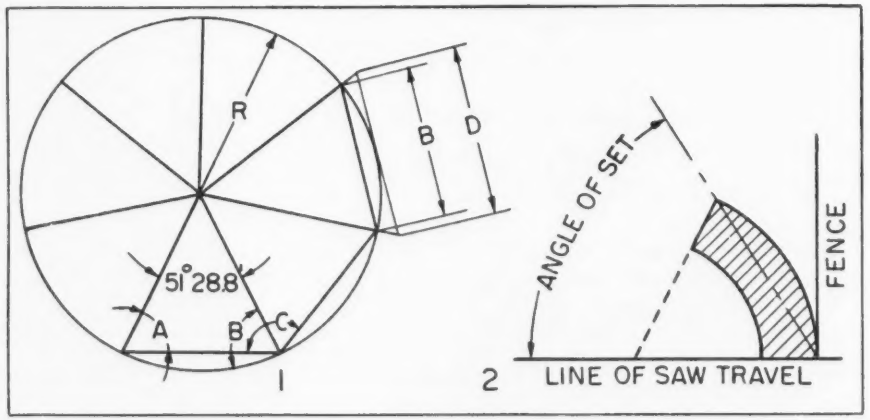

Fig. 1—Heptagon showing the various angles and dimensions used in laying out the pattern. Fig. 2—In sawing the segment for a regular polygon the angle of set must be exact to obtain a good joint

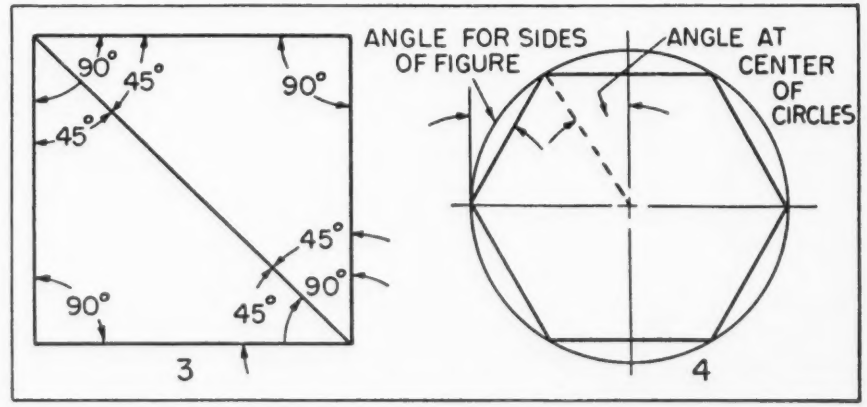

Fig. 3—The sum of the angles of a square equals 360 degrees, and those of a triangle 180 degrees. Fig. 4—Illustrating the various terms indicated in Table II

TABLE I

Data For Regular Polygons

Name of Polygon	Number of Sides	Angles at Center	Angles Between Adjacent Sides	Side of Polygon Inscribed in Circle	Radius of Inscribed Circle	Angle of setting stop
Triangle	3	120°	60°	1.732	0.2887	30°
Square	4	90°	90°	1.4142	0.5	45°
Pentagon	5	72°	108°	1.1756	0.6882	54°
Hexagon	6	60°	120°	1.000	0.866	60°
Heptagon	7	51° 25.8′	128° 34.2′	0.8676	1.0383	64° 17.1′
Octagon	8	45°	135°	0.7653	1.2071	67.5°
Nonagon	9	40°	140°	0.684	1.3737	70°
Decagon	10	36°	144°	0.618	1.5388	72°
Undecagon ..	11	32° 43.8′	147° 17′	0.5634	1.7028	73° 38.5′
Dodecagon ..	12	30°	150°	0.5176	1.866	75°

TABLE II

Table For Dividing Circles or Laying Out Geometrical Figures

No. of Sides	Included Angle	Angles at Center of Circles in any quadrant	Angles for Sides of Figures in any quadrant
3	120°	30°	30°
4	90°	45°	45°
5	72°	18°—54°	36°—72°
6	60°	30°	30°
8	45°	45°	22° 30′
10	36°	54°—18°	18°—54°
12	30°	60°	15°—45°
14	25° 43′	60° 17′—38° 34′—12° 51′	12° 51′—38° 34′—64° 17′
16	22° 30′	67° 30′—45°	11° 15′—33° 45′
18	20°	70°—50°—30°—10°	10°—30°—50°—70°
20	18°	72°—54°	9°—27°—45°
24	15°	75°—60°—45°	7° 30′—22° 30′—37° 30′

Some Applications of Geometry in the Patternshop

Fig. 3 illustrates the number of degrees in a triangle and square. The sum of the angles of a square equals 4 x 90 or 360°. The triangle shows 90 plus 45 equals 180°. Then in any triangle the sum of the angles is 180° regardless of the shape.

Referring again to Table I column 4: As the sum of the angles of a triangle is 180°, and as one angle is known as 51° 25.8′, then the sum of angles A and B equals 180° minus 51° 25.8′ or 128° 34.2′ which is also the same as angle C.

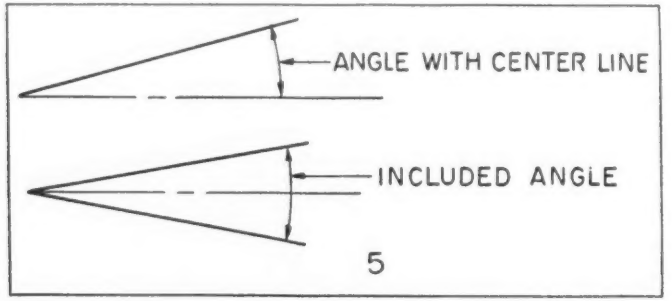

Fig. 5—Taper may refer to the angle with the center line or to the included angle. Tables III and IV give common tapers and corresponding angle

TABLE III

Tapers per foot and Corresponding Angles

Taper per foot Inches	Included Angle	Angle with Center Line	Taper per foot Inches	Included Angle	Angle with Center Line
1/16	0° 36′	0° 18′	1	4° 46′	2° 23′
1/8	1° 12′	0° 36′	1½	7° 09′	3° 35′
3/16	1° 30′	0° 45′	1¾	8° 20′	4° 10′
3/8	1° 47′	0° 54′	2	9° 31′	4° 46′
7/16	2° 05′	1° 02′	2½	11° 54′	5° 57′
½	2° 23′	1° 12′	3	14° 15′	7° 08′
5/8	3° 35′	1° 47′	3½	16° 36′	8° 18′
7/8	4° 28′	2° 14′	4	18° 55′	9° 28′

Tables II and III will be found convenient to patternmakers especially in allowing for draft and in laying out geometrical figures. Table II is illustrated by Fig. 4.

Table III with Fig. 5 is self explanatory. Many of the figures are used in making draft on patterns and often drawings will come to the shop showing tapers of castings wanted. An order may be made out for a certain taper per foot on a side which means the angle with the center line or it may specify total taper or the included angle. If the drawing calls for a certain number of degrees, it is understood to mean the included angle or total taper.

TABLE IV

Tapers and Corresponding Angles

Taper Per Foot in Inches

1/16	1/8	3/16	1/4	5/16	3/8	7/16	1/2	5/8	3/4	7/8	1	1⅛	1¼
Corresponding Angles for Tapers													
0	0	0	1°	1°	1°	2°	2°	2°	3°	4°	4°	5°	5°
17′	35′	53′	11′	29′	47′	5′	23′	59′	34′	10′	46′	21′	57′
54″	48″	44″	36″	30″	24″	18″	10″	42″	44″	32″	18″	44″	48″

Taper Per Inch in Inches

No. of in.													
1	0.0052	0.0104	0.0156	1/64	1/64	1/32	1/32	3/64	3/64	1/16	5/64	5/64	3/32	7/64
2	0.0104	0.0208	0.0313	5/64	5/64	1/16	9/64	5/64	7/64	1/8	9/64	11/64	1/16	13/64
3	0.0156	0.0312	0.0469	1/16	5/64	3/32	7/64	1/8	5/32	1/16	7/32	1/4	9/32	1/16
4	0.0208	0.0417	0.0625	5/64	7/64	1/8	9/64	11/64	13/64	1/4	19/64	21/64	5/8	27/64
5	0.0260	0.0521	0.0781	7/64	1/8	5/32	3/16	13/64	17/64	5/16	23/64	27/64	15/32	33/64
6	0.0312	0.0625	0.0938	1/8	5/32	3/16	7/32	1/4	5/16	3/8	7/16	1/2	9/16	5/8
7	0.0365	0.0729	0.1094	9/64	5/16	7/32	1/4	19/64	23/64	7/16	33/64	37/64	21/32	47/64
8	0.0117	0.0833	0.1250	11/64	13/64	1/4	19/64	21/64	27/64	1/2	37/64	43/64	3/4	53/64
9	0.0469	0.0937	0.1406	1/16	15/64	9/32	21/64	3/8	15/32	9/16	21/32	3/4	27/32	15/16
10	0.0521	0.1042	0.1563	13/64	17/64	5/16	23/64	27/64	33/64	5/8	47/64	53/64	15/16	1 3/64
11	0.0573	0.1146	0.1719	15/64	9/32	11/32	13/32	29/64	37/64	11/16	51/64	59/64	1 1/32	1 9/64
12	0.0625	0.1250	0.1875	1/4	5/16	3/8	7/16	1/2	5/8	3/4	7/8	1	1⅛	1¼

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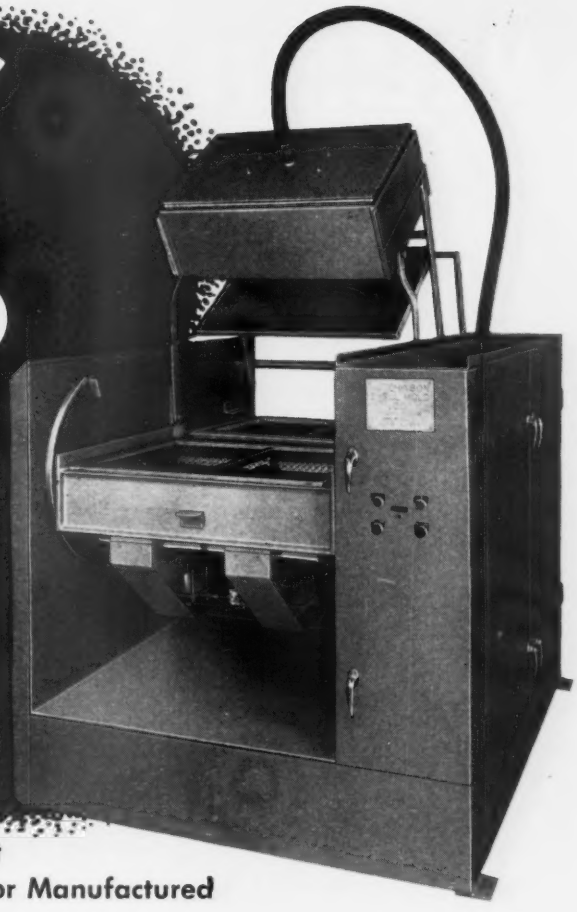

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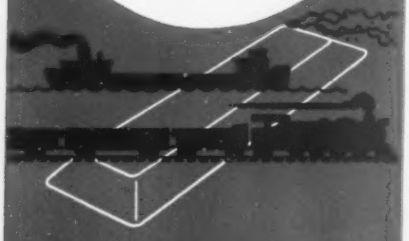

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Circle 728 on Inquiry Card—Page 219

How To Treat Silica Brick To Eliminate Dust Hazard

Lignosulfonate Solution Ends Production of Dust

By

C. E. Cline and R. A. Bloom*

SILICA brick is used extensively in electric arc and open-hearth furnace construction, as it is at Timken Roller Bearing Co., Canton, O., where silica brick is used in electric arc furnace roofs. It has given satisfactory service in this application for many years, but also has created a serious health problem because of silica dust created during handling.

The major source of this dust has been reduced by elimination of as much hand cutting or shaping of the brick as possible. This reduction was accomplished by development of special shapes and use of an enclosed, vented saw for necessary cutting. Dust from handling the brick during unloading, stacking and laying-up is, however, still a serious problem.

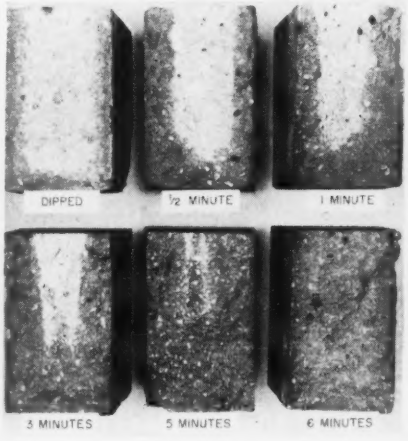

Fig. 1—Quarter sections of brick dipped for varying lengths of time indicate penetration of solution

Concern about this harmful dust concentration led to an investigation of surface treating silica brick to eliminate dusting on handling. Several procedures can be used to bind loose particles to the brick surface to prevent dusting, but for the treatment to be feasible, the process must be inexpensive, simple and not injurious to refractory properties. Some of the materials considered as dust inhibitors included paint, plastic coatings, oil, sugar solutions and dry

*Mr. Cline is superintendent, masonry department, Timken Roller Bearing Co., Canton, O., and Mr. Bloom is research metallurgist, Timken Roller Bearing Co.

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binders (used in water solution).

Brick treated with these materials were subjected to abrasion and impact effects such as might be encountered in service. All treatments appeared to be effective in decreasing or eliminating visual evidence of dusting. Paint and plastics were discarded as too involved and expensive, however, and the oil was abandoned because of complications resulting from an oily surface. The water solution of dry binders was very effective in eliminating the dust arising from impact and abrasion effects. Of the dry binders tested, the ammonium lignosulfonates appeared the most promising for the following reasons:

1. Inexpensive and readily available.
2. Water soluble without disagreeable odor.
3. Easily applied by immersion or spray.
4. Dries rapidly to form a resinous coating.

Laboratory investigations were made with several brick treated by

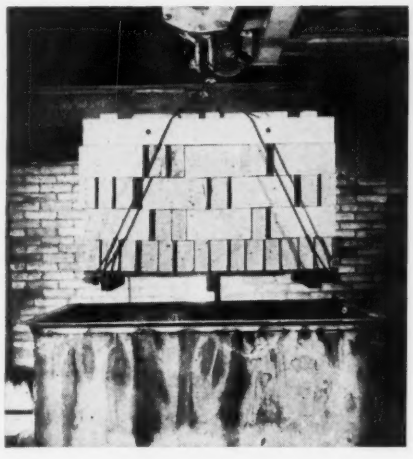

Fig. 2—Facilities were set up to permit treatment of full pallets of silica brick by dipping them

immersion in a solution of 1 lb of such a substance per gallon of water. The tests demonstrated that this treatment was completely effective in eliminating visual evidence of dusting. A quarter-section of the brick shown in Fig. 1 indicates the rate of solution penetration on immersion.

Further tests were conducted to determine whether the treatment would affect refractory properties of the brick. Results of the American Society for Testing Materials pyrometric cone equivalent test, a measure of the relative refractoriness of the material, showed that the materials used as binders have no effect on refractoriness of the brick.

On the basis of these laboratory findings, brick were treated for use in electric arc furnace roof construction. The treated brick gave complete absence of visible dust on handling, yet were indistinguishable from untreated brick in service.

Facilities then were set up to permit treatment of full pallets of silica bricks for use in electric arc furnace roof construction. The installation is shown in Fig. 2. It was found that a pallet of bricks could be treated without restacking or special handling. Even brick from the center of a pallet that had not been restacked before treatment were treated effectively.

The procedure for preparing the liqnosulfonate solution simply involves adding the powder to the water and mixing with air agitation. An antifoam agent is added to kill the foam blanket that forms during mixing. On application, the solution penetrates the brick surface and dries rapidly by absorption to form a resinous-type coating that binds loose particles to the brick.

Since the plant trial, the treated brick have been used in construc-

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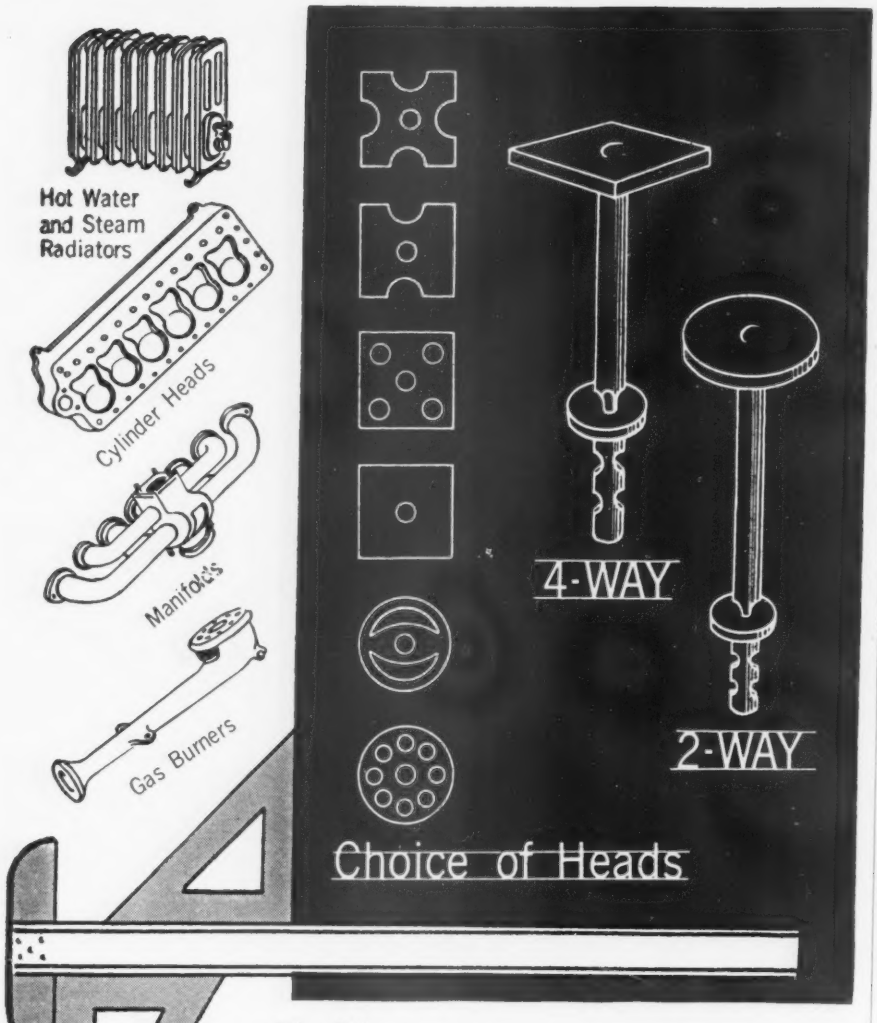

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tion of over 50 electric furnace roofs. Bricklayers report complete absence of dust from the treated brick, and service records of these roofs show that treatment has not been detrimental to roof life. Thus production experience confirms results of the laboratory and plant trial tests.

The immersion technique results, however, in a greater consumption of solution than necessary, as Fig. 1 indicates. Surface penetration of only a fraction of that obtained by dipping would inhibit the dust formation effectively. A spray application of the solution to the refractory by the manufacturer should be more efficient and should be beneficial to both manufacturers and consumers of silica refractories.

Issues Report on Protective Equipment for Noise Control

A report on "Noise Control Personal Protective Equipment" is available on request to Sigma Engineering Co., 1491 Vine St., Los Angeles 28, Calif. Based on results of tests by a major insurance company, the report covers unbiased comparative tests of commercial ear muffs, ear plugs and ear valves and includes interesting conclusions regarding the best hearing protection.

Comprehensive tests were conducted under exposure to all types of excessive industrial noise. These tests took into consideration the major factors concerned with a proper hearing conservation program.

Book Reviews

Theoretical Structural Metallurgy by A. H. Cottrell, paper, 251 pages. 5⅜ x 8⅜ in., published by St. Martin's Press Inc., 103 Park Ave., New York 17. Price $4.50.

This second edition, while arranged similarly to the first edition, has been completely rewritten to incorporate the modern concepts resulting from activities in all branches of metal science during the past decade as well as newer developments.

The book is divided into 15 chapters with the first eight discussing such phases as structure of the atom, forces between atoms, metallic crystals, free electron theory, zone theory, applications of the electron theory, equilibrium and rate of approach to equilibrium. Remaining chapters deal with thermal behavior of metals, structure of alloys, free energy of alloy phases, equilibrium diagram, diffusion in metals and alloy, order-disorder change in alloys, kinetics of phase changes, and shear processes in metal crystals.

Vacuum Technology Is Subject Of Symposium in Chicago

The Third National Symposium on Vacuum Technology will be held Oct. 10-12 at the Hotel Sheraton, Chicago, according to the Committee on Vacuum Techniques Inc., Boston.

Papers will be presented with particular emphasis in the following categories: 1. Fundamental developments in vacuum technology. 2. Methods and techniques for obtaining high vacuum. 3. Instrumentation and control of high-vacuum equipment. 4. Vacuum distillation and evaporation. 5. Metallurgical and chemical applications. 6. Vacuum technology as related to atomic energy and extra-terrestrial problems.

Further information is available from Axel H. Peterson, chairman, Committee on Publications and Publicity, 4400 Fifth Ave., Pittsburgh 13.

Eastman Offers Handbook for Industrial Photographers

With completion of a handbook titled "How-To-Do-It Pictures," Eastman Kodak Co., Rochester 4, has made available a revised handbook for industrial photographers. Besides the new publication, the revised handbook contains three other booklets: "Photographic Production of Slides and Filmstrips," "How To Organize and Operate Photographic Service Departments," and "Making Service Pictures for Industry." The complete Kodak industrial handbook, which sells for $4, is designed to assist the industrial photographer with any problems concerning procedures, materials and techniques he might employ.

Like the other publications in the handbook, the new booklet is a com-

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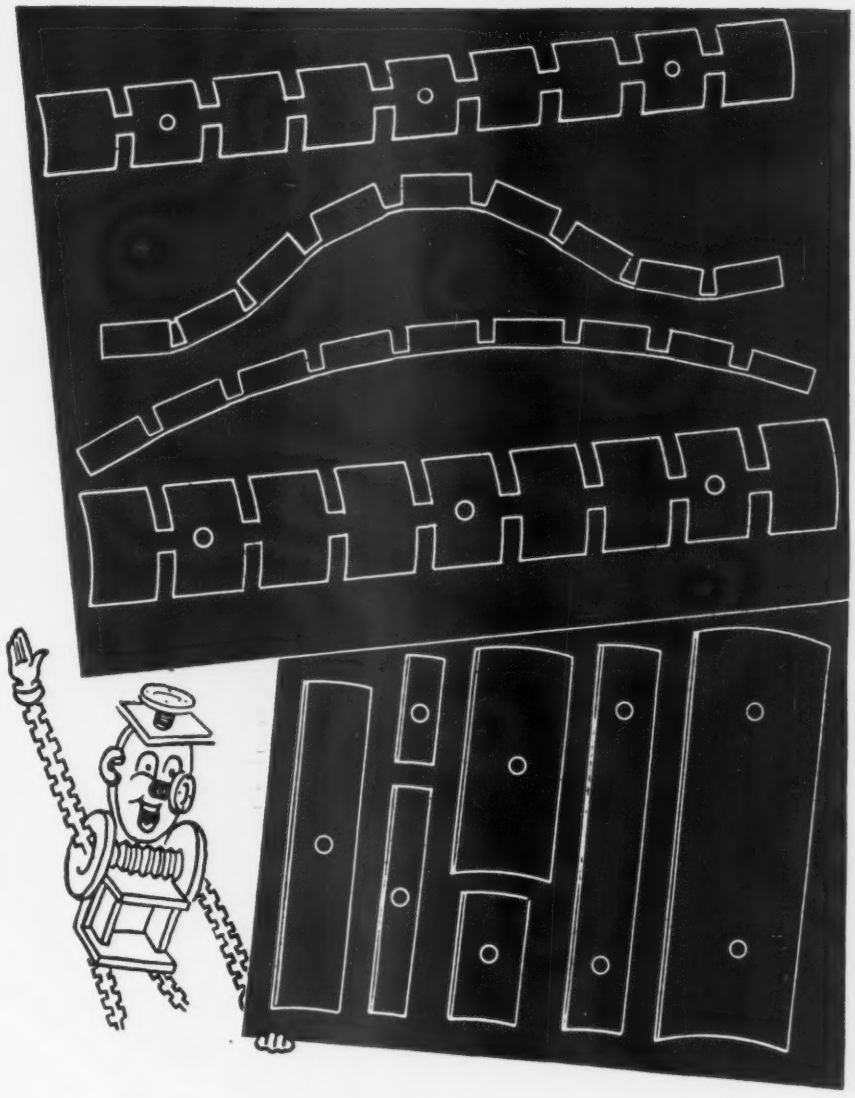

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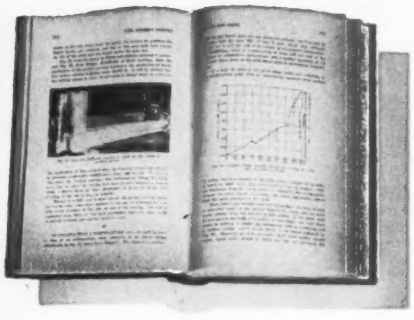

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252 charts and illustrations
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Just published—*Steel Foundry Practice*—a new comprehensive sourcebook covering all phases of modern steel foundry practice. This book is the only up-to-date treatment of the subject available today.

Steel Foundry Practice contains practical information on almost every production problem steel foundrymen encounter. The easy-to-read text is accompanied by over 250 detailed charts, drawings and illustrations of the "how-to-do-it" type.

This volume represents the last of the many contributions which the late John Howe Hall made to the progress of the foundry industry. Material presented in this book began as a series of articles in FOUNDRY magazine.

Steel foundry personnel (from top executives to apprentices), educational institutions, technical libraries, suppliers to the steel foundry industry . . . all will benefit from the use of this book.

A complete cross index permits ready reference to any section. Many references relating to additional sources of information are provided. Use the coupon at the bottom of this page to order your copies now.

ABOUT THE AUTHOR

The late John Howe Hall was associated with the production of steel castings for nearly 50 years. Mr. Hall received his bachelor's and master's degrees from Harvard University. He was employed by Bethlehem Steel Co. and Buffalo Crucible Castings Co. until 1906, when he joined Taylor-Wharton Iron & Steel Co. He remained there until 1937, when he became a consulting metallurgist. His previous major work was The Steel Foundry, *published in 1914, with a second edition in 1922.*

Mr. Hall was the author of many papers presented before the American Society for Testing Materials, the American Foundrymen's Society, the American Institute of Mining and Metallurgical Engineers and the American Society of Mechanical Engineers. In 1924, he received the first Whiting Medal awarded by the AFS.

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13. Pouring Practice

plete guide for the industrial photographer in a specific area. It describes methods and equipment used to make the many "how-to" type pictures required by modern business and industry for manuals, catalogs, posters, bulletins, news releases, etc. Price is 50 cents. Handbook owners may register, through a postcard included with the book, for the special information services maintained by the company.

Machinery Products Institute Issues Tax Depreciation Data

Machinery and Allied Products Institute has published a study of business investment policy outlining the effect of the new tax depreciation methods on the earnings of depreciable assets. Conclusions of the study, which is based on a forthcoming institute book, by George Terborgh, MAPI research director, merit the attention of executives, accountants and students in the field.

The new study supplements a former work, *Realistic Depreciation Policy*. Together they document the conclusion that realistic tax depreciation is beneficial not only to individual taxpayers, but to the economy as a whole.

Copies of this pamphlet are available on request from Machinery and Allied Products Institute, 1200 18th St., N. W., Washington 6, D. C. Single copies are $1; quantity prices on request.

Material Handling Clinics Are Set for Buffalo and Chicago

Traveling clinics developed last year by the Material Handling Institute, Pittsburgh, will be held in Buffalo and Chicago shortly. The Buffalo clinic on Nov. 14 will be held on the campus of the University of Buffalo, co-sponsor. On Nov. 15, the Chicago clinic will be held, co-sponsored by Illinois Institute of Technology and Northwestern University. The clinics are sponsored locally by chapters of the American Material Handling Society.

Twenty executives of MHI member companies will serve on four panels to discuss receiving and shipping; scrap collection, handling and disposition; storage, warehouse and yard handling; and in-process handling. Those attending the clinics may present material handling problems for discussion and suggestion.

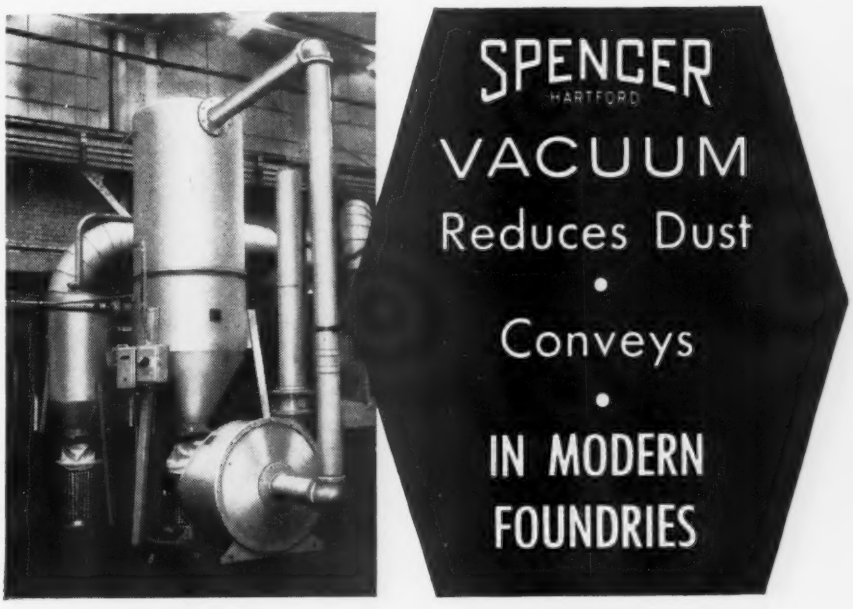
M. W. Heinritz, vice president of Gould-National Batteries Inc., is chairman of the institute's committee on co-operation with professional societies.

Catalog of 50 Material Handling Films Is Ready

Fifty material handling educational and training films available from members of the Material Handling Institute Inc. are listed in a new catalog available free on request.

The films cover all phases of material handling and are grouped according to ten major categories: Batteries and battery care; cranes; fork lift trucks; hand lift trucks; truck attachments, material handling in specific industries; material handling fundamentals; mechanical handling of specific products; safety; and steel strapping applications.

Descriptive resumes and data on running times and where to obtain the films are included in the catalogue. Copies may be obtained from the Material Handling Institute Inc., Suite 759, One Gateway Center, Pittsburgh 22, Pa.



This large captive foundry has been using Spencer Vacuum for ten years. The illustration shows their latest installation—a 25 HP Stationary System which is piped all over the foundry, just like compressed air, except that it does not blow the dust all over the plant. It is used for removing sand from steel molds, chips from castings and overhead cleaning. Spencer Vacuum is also used to convey and reclaim sand.

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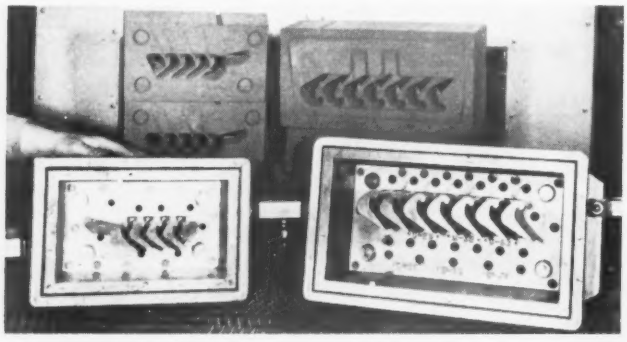
Copper Alloy Inserts Have Long Life

USE OF A special copper alloy for corebox inserts at Lebanon Steel Foundry, Lebanon, Pa., is reported to have increased the production rate of a cast steel part by 1400 per cent. In addition, Lebanon is said to have cut the cost of each core by about 70 per cent and to



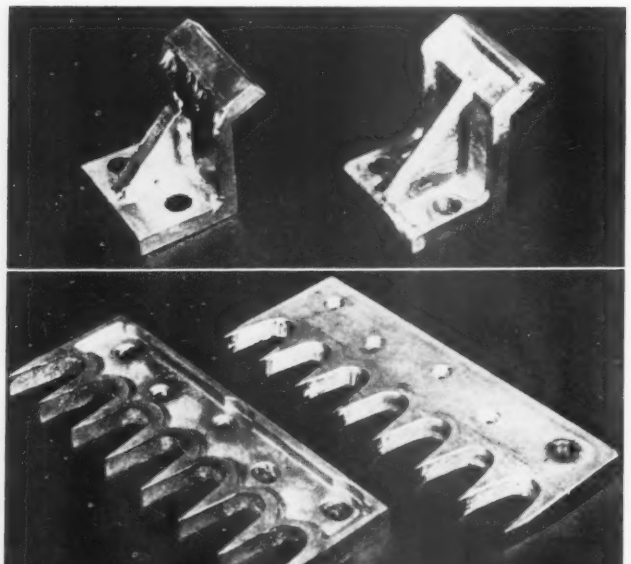
have eliminated all shutdown time required for corebox repair.

These benefits were obtained in the mass production of armor steel louver blade castings for the M-47 and M-48 Army tanks. Corebox design created severe wear conditions for the metal inserts used. Space between blades was so narrow that sand entering through blow-holes at 90 psi blasted the inserts and quickly made them unusable. Lebanon made its first beryllium copper inserted corebox in 1952 and since has turned out about 20,000 cores in it. The same box is expected to turn out from 20,000 to 64,000 more cores. All of the more than 200 inserts Lebanon uses were made from a special beryllium copper supplied by Beryllium Corp., Reading, Pa., and all still are serviceable.

For More Details Circle No. 448—Page 219

Shell Molding Converts Parts to Castings

TWO TYPES of blades for Carrier Corp. automatic flake-ice making machines now are cast by shell methods by Bennett-Ireland Inc., Norwich, N. Y., at a cost reduction of 50 per cent. Ice removing blades formerly



flame cut and machined from bar steel, then drilled, now are cast in shell molds, as are scraping blades which previously were four-piece weldments. The latter are cast integrally. Besides their lower cost, the manganese bronze cast blades have better corrosion-resistant qualities. Both blades previously were built up by copper, nickel and chrome plating, but cast parts are chrome-plated only to provide long wearing tooth surfaces.

For More Details Circle No. 449—Page 219

How To Stack Palletized Grinding Wheels

PALLETIZED GRINDING WHEELS are stacked three or four pallets high with a space-saving system developed by Larry Dauer (left) and Joe Lippert, employees in the Pittsburgh warehouse of Norton Co., Worcester,

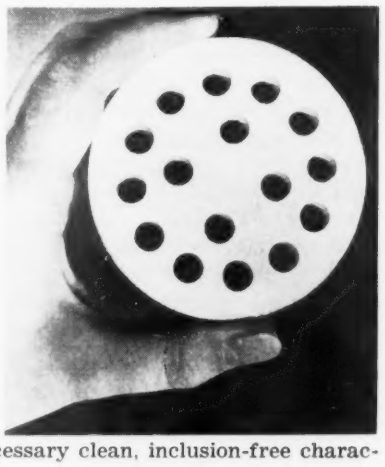
Mass. Key to the system is the wooden saddle they are holding.

Made of palletizing lumber reinforced with a steel strap, the saddle makes it possible to stack nearly twice as many pallets in the same area required by the old system of "pyramid stacking."

For More Details Circle No. 450—Page 219

Ceramic Strainer Cuts Casting Rejections

MORE THAN 30 different formulations were tested by Universal Clay Products Co., Sandusky, O, during development of the low-porosity ceramic strainer core which is shown here. Use of the new strainer core has eliminated almost completely the high loss formerly encountered during the casting of boat propellers of high manganese bronze at Michigan Wheel Foundry, Grand Rapids, Mich. With the new core, finished castings are said to possess the necessary clean, inclusion-free characteristics.



For More Details Circle No. 451—Page 219

USE B·A STANDARD OF PURITY

Alkali Fluoborates

Ammonium Fluoborate
Potassium Fluoborate
Sodium Fluoborate

Better Heat Treating

Baker & Adamson Alkali Fluoborates are easily-handled purifying salts which the foundryman can use like precision tools for a wide range of purposes when casting magnesium, or when melting, heat treating or refining aluminum.

Better Castings

When used as a purifying flux in aluminum melting, B&A Potassium Fluoborate improves the mechanical and physical properties of the casting, resulting in increased tensile strength, greater elongation, improved machinability. These results are obtained with the addition of just one to four ounces per hundred pounds of metal.

Excellent Oxidation Inhibitors

In magnesium casting, B&A Alkali Fluoborates are used with both green sand and core sand to provide a protective atmosphere which prevents oxidation. Foundries using these fluoborates have obtained better castings with fewer rejects. Also, core making is easier and the resulting cores are faster to collapse and easier to shake out.

Write or call your nearest B&A Office for full information. Shipment is fast from the nationwide chain of B&A distributing stations.

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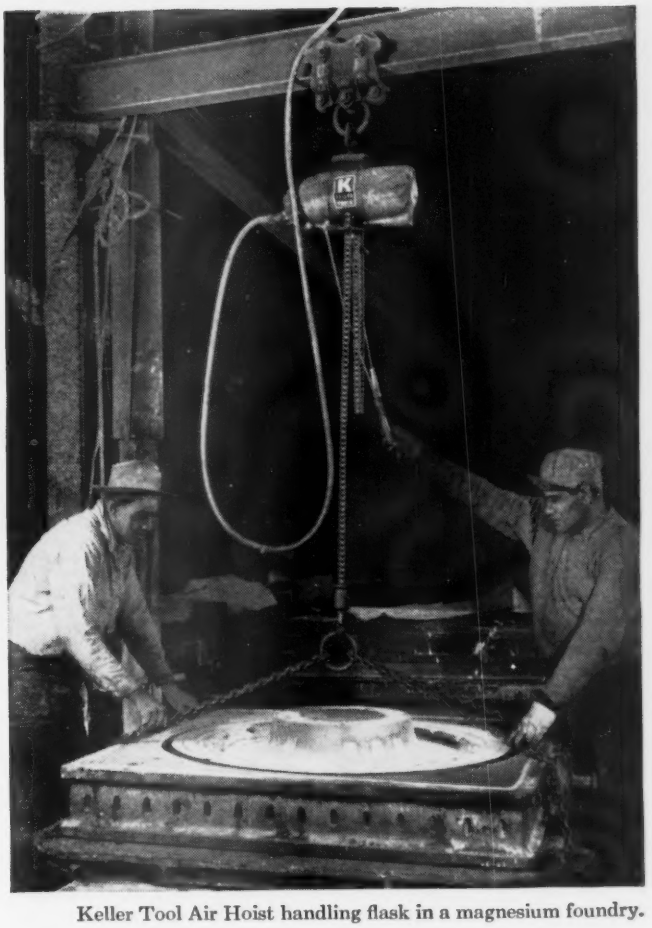
*Complete stocks carried here

Circle 734 on Inquiry Card—Page 219



Keller Tool Air Hoist handling flask in a magnesium foundry.

GENTLE yet TOUGH

Easy does it on the lifting. Speed when you want it. Gentle, accurate stops. This lightweight husky (weighs only 28 lb.) will take on lift jobs all day without a whimper. Cannot burn out.

CHECK THESE FEATURES BEFORE YOU BUY ANY HOIST

- **NO BURN-OUT** from overload or stalling.
- **LOW MAINTENANCE** — rugged piston-type motor unaffected by dust or fumes.
- **ECONOMICAL**—uses much less air than other hoists of same capacity.
- **CONTROLLED SPEED**—from creep to maximum.

LET KELLER TOOL AIR HOISTS GIVE YOUR FOUNDRY A "LIFT." Your request for Catalog 86 will bring details in a hurry.

Model	Capacity	Speed	Weight
86-2V20	2000 lb.	19 f.p.m.	78 lb.
86-2V10	1000 lb.	35 f.p.m.	78 lb.
86-1V10	1000 lb.	19 f.p.m.	28 lb.
86-1V5A	500 lb.	35 f.p.m.	28 lb.
86-1V3	300 lb.	80 f.p.m.	28 lb.

GARDNER-DENVER
KELLER TOOL division, Grand Haven, Michigan
THE QUALITY LEADER IN COMPRESSORS, PUMPS, ROCK DRILLS AND AIR TOOLS FOR CONSTRUCTION, MINING, PETROLEUM AND GENERAL INDUSTRY

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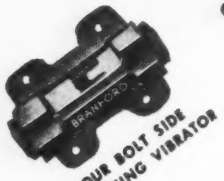
Since 1915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HOSE CLAMP

TWO BOLT SIDE MOUNTING VIBRATOR

DOUBLE ATTACHING HEAD VIBRATOR

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VIBRATORS
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RENEWABLE NOZZLE CLEANER & SPRAYER

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HOSE NIPPLE

STARTING VALVE

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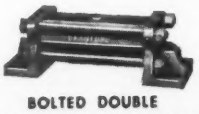
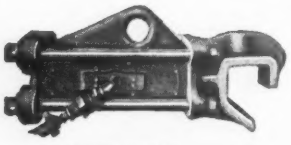

BOLTED DOUBLE ATTACHING HEAD VIBRATOR

END MOUNTING VIBRATOR


FLASK RAPPER

BLOW GUN 450

The BRANFORD Company
CONTINUING NEW HAVEN VIBRATOR COMPANY
130 CHESTNUT STREET, NEW HAVEN, CONN.

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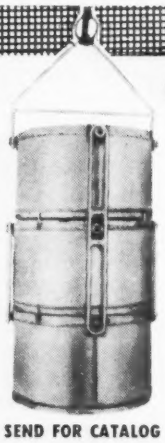

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STANDARDS or CUSTOM MADE TO YOUR SPECIFICATIONS.

Wiretex mfg. co.

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Circle 737 on Inquiry Card—Page 219

"The Ringlift has helped us more than any other piece of equipment we have ever purchased", says General Manager of this leading Midwestern gray iron jobbing foundry.

After More Than 500,000 Tons

This hot, hard, lumpy sand is prepared, cooled and tempered by the Ringlift without prior addition of water. Sand is mixed, blended, screened, magnetically separated, triple aerated. You, too, can save by preparing your sand properly, right on the floor where it will be used. Investigate Ringlift today.

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Circle 738 on Inquiry Card—Page 219

the right answer for every casting job

SUPERIOR CASTING ALLOYS

HENNING BROS. & SMITH, INC.

"Dependable service since 1922"
91-125 Scott Ave. at Randolph St., Brooklyn, N. Y.
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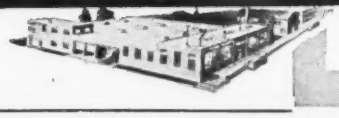

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Aluminum
Zinc • Lead • Tin
Zinc & Cadmium Anodes

Special alloys to meet the most exacting requirements of engineer and caster.

Laboratory controlled production. Shipments strapped on consumable pallets.

Circle 739 on Inquiry Card—Page 219

SILICAMIX . . . a new, superior, gun-shot CUPOLA PATCH

BUCKEYE SILICAMIX is a new development that provides a superior gun-shot mix for patching gray iron cupolas. Its uses provide the same qualities and results from this gun-shot material that have been so popular with the well known Buckeye Silica Firestone. Buckeye Silicamix is actually small pellets of this firestone, coated with clay—a special refractory fire clay. When applied under pressure with water, Buckeye Silicamix sticks tighter to the cupola walls, keeping costly "drop" to a minimum.

Try SILICAMIX on your cupola patching job . . . . . .

A Buckeye refractory engineer will bring you free samples for inspection and trial. See for yourself how its faster "buckshot" action adds up to more economical cupola operation.

SILICA CHEMICALS, INC.

Subsidiary of The Cleveland Quarries Co.

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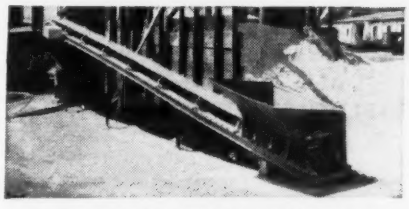
If you think Barber-Greene makes only BIG conveyors . . .

you haven't heard of the . . .



375 TRANSFER CONVEYOR

- ★ lengths from 8'
- ★ widths 18", 24" and 30"
- ★ handles almost any bulk material

NEW FOLDER

. . . shows how you can figure your own horsepower and belt width in a minute.

see your B-G distributor or write

Barber-Greene

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for Heating and Drying Electric Furnace Linings

HIGH PRESSURE AIR-GAS TORCH BURNER WITH EXTRA LONG SWEEP ELBOW AND RETAIN-A-FLAME NOZZLE

Outstanding for drying and preheating refractory linings of induction, indirect or direct arc and fuel-fired rotary furnaces; for vitrification of rammed refractory linings. Offers wide range of heat input from extra low turndown to full high temperature heating. Portable; light weight; easily clamped to furnace with long sweep elbow nozzle inside. Burns any fuel gas with at least 40 p.s.i. compressed air. Also made in oil-burning type. Write for Bulletin 1079.

HAUCK MANUFACTURING CO.

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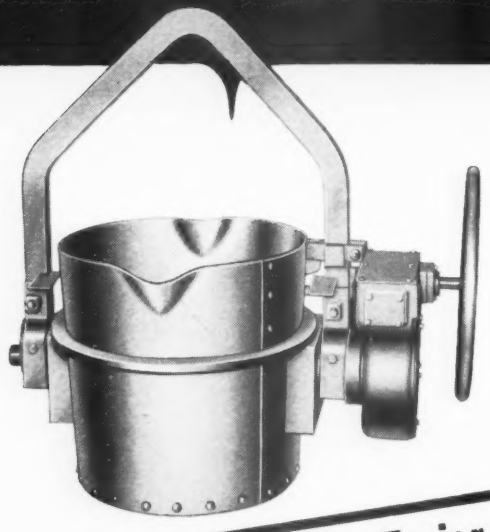
JOB ENGINEERED for Greater Pouring Efficiency



Pour More Metal Per Day Easier—Safer—With Less Man Power

Regardless of the ladle equipment you may need—standard or custom—Industrial makes them both, and both are "Job Engineered" to offer you these advantages:

- Ease of operation—Greater Safety
- Elimination of heat distortion and binding
- Elimination of gear wear from binding
- Rugged, heavy duty construction for longer, more profitable service
- Easier maintenance

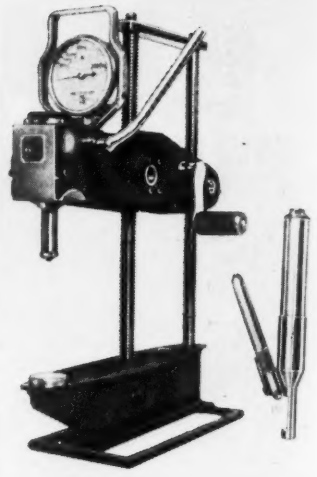
Industrial Equipment Co. manufactures a complete line of standard and custom pouring and handling equipment—Bowls . . . Shanks . . . Bails . . . Tongs. Write today for latest catalog.

Industrial
EQUIPMENT COMPANY
115 OHIO ST., MINSTER, OHIO

Circle 743 on Inquiry Card—Page 219

Insure Quality Control of Castings

through accurate hardness tests



For over a quarter of a century, King Portable Hardness Testers have set the standard for portable Brinell Machines. Precision testing of parts of any size, in any position, anywhere, utilizing a 3000 Kg. load on a 10 MM. ball giving a clear sharp impression, are some of the principal features. This high standard of accuracy and performance has been integrated into a system of standard adapters for use with the basic unit, making the King Portable Brinell a machine of universal application. Weighs only 28 lbs. Write for complete description and specifications.

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FOUNDRY

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LEE ROAD AT MAYFIELD
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CONSULTANTS

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Phone: ALpine 1-9135

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No. 4 DAYTON RING VALVE BENCH RAMMER

MORE POWER—MORE SPEED

You'll get more production with these faster, more powerful rammers and at the same time substantially reduce maintenance costs.

The Valve Units will last for years. The Cylinder Bores and Piston Rods are HARD CHROME PLATED which doubles the life of the Rammer. Many of the largest foundries in the country have already adopted them as standard. Made in six sizes to meet every requirement.

Send for Bulletin 300

DAYTON PNEUMATIC TOOL CO.

Manufacturers of Pneumatic Tools Since 1903

DAYTON, OHIO

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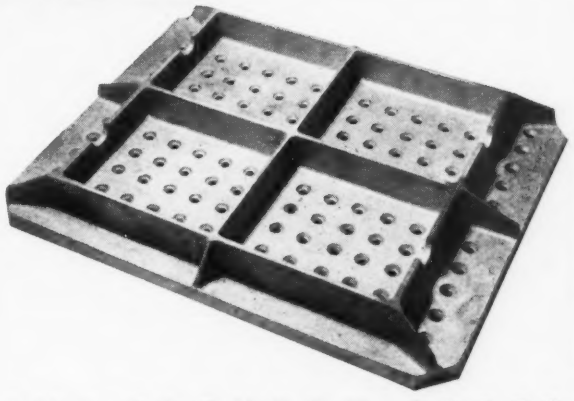
NEW ALUMINUM BOTTOM BOARDS



CUT FOUNDRY COSTS

- Will not warp or burn
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- Raised sand strip (optional) around outer edge peens each mold uniformly and eliminates sand slippage
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Write for prices on standard sizes

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TAM* ZIRCONITE* FOUNDRY PRODUCTS

Give you the most for your money!

The finer grain of Zirconite* products offers cost-saving advantages in steel, iron, bronze, aluminum or magnesium foundry operations.

ZIRCONITE* PASTE WASH

Does not fuse with molten metal. Resists metal wetting. Prevents metal penetration. Produces smooth casting surfaces.

ZIRCONITE* FLOUR

Used as a filler in cores. Lowers permeability. Increases refractoriness.

ZIRCONITE* SAND

Eliminates the problems of burning-in and penetration. An excellent means of chilling heavy sections to promote directional solidification and to eliminate heavy risers.

Put the money-saving advantages of TAM* ZIRCONITE* products to work in your operation. Write our New York office for detailed information. Discuss them with our field engineers.

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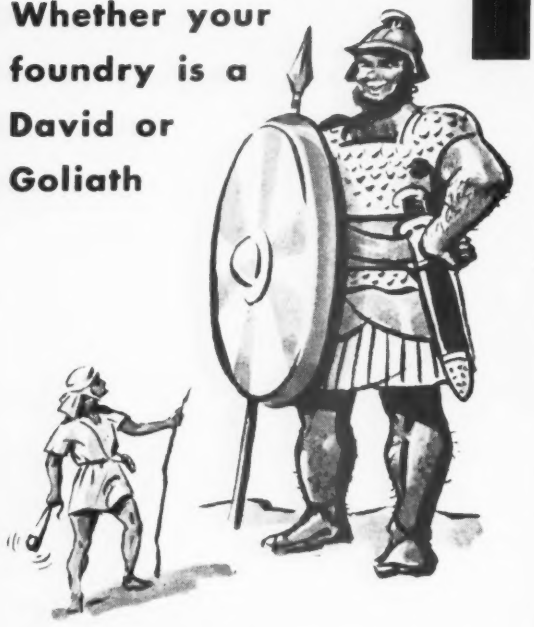
Circle 749 on Inquiry Card—Page 219

SCHNEIBLE

Whether your foundry is a David or Goliath



A Schneible Dust Control System will fill your needs

Schneible equipment for the control of dust, fumes and vapors is designed for all foundries, small or large.

More than twenty years of experience in the solving of varied problems of foundry air pollution go into every collector manufactured by Schneible.

Recent improvements in design and application make the Schneible Multi-Wash a most efficient and economical unit. These design changes now allow you to own the absolute best in wet dust collection equipment at a greatly reduced cost per 1,000 CFM of air handled.

Schneible Multi-Wash Collectors are easy to service. There are no moving parts, no spray nozzles to plug, nothing to freeze, and a simple flushing with a fire hose a few times a year gives you long maintenance-free service.

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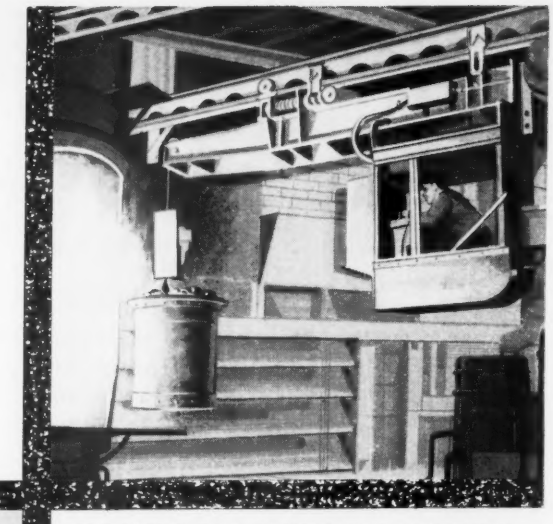
SERVING FOUNDRYMEN THE WORLD OVER

Circle 750 on Inquiry Card—Page 219



FOUNDRY INSTALLATIONS

Commercial Contracting Corporation has installed or modernized foundries for all the major automotive producers. Utilize this experience to up-date your own foundry facilities.

Write for information

COMMERCIAL CONTRACTING CORPORATION
GENERAL CONTRACTORS
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Circle 751 on Inquiry Card—Page 219

Zircon Sand
Zircon Flour
Silica

BERKSHIRE

Potassium
Titanium
Fluoride

Potassium
Zirconium
Fluoride

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Circle 752 on Inquiry Card—Page 219

OLIVER Jig Saws save time cutting scrolls on patterns

No. 173E JIG SAW cuts stock up to 9" thick with accuracy. Table turned ⅛th way around to increase capacity; tilts 30° to right or left. New tension device insures smoothest work. Controlled by foot-lever.

No. 173S JIG SAW has upper tension unit mounted on ceiling for unlimited capacity. Table is 73" or 34" square. Also cuts light metals.

• *Write today for Bulletin No. 173*

OLIVER EQUIPMENT FOR PATTERN SHOPS

Saw Benches	Jig Saws	Shapers	Wood Trimmers
Cut-Off Saws	Surfacers	Pattern Millers	Oilstone Tool Grinders
Band Saws	Jointers	Borers and Routers	Woodturning Lathes

OLIVER MACHINERY COMPANY

Established 1890 **GRAND RAPIDS 2, MICH.**

Circle 753 on Inquiry Card—Page 219

HOW MUCH IS "DOWN-TIME" COSTING YOU?

NO FLATS WITH **MITCO** INDUSTRIAL TIRES!

No work stoppage caused by punctures or blowouts!

Replaces conventional pneumatic tires on Payloaders, Fork Trucks, Tractors, Industrial Carts and other Industrial Equipment.

LOAD CAPACITY equal to the heaviest ply pneumatic tire.

TRACTION far superior to any continuous tread tire. Mitco Tires have sure-grip tread.

RESILIENCY of the Mitco Tire compares favorably with pneumatic tires.

STEERING is easier, more accurate, when industrial equipment has Mitco Tires.

Try a Set of **MITCO'S** Satisfaction Guaranteed!

Write or wire us for Nearest Distributor

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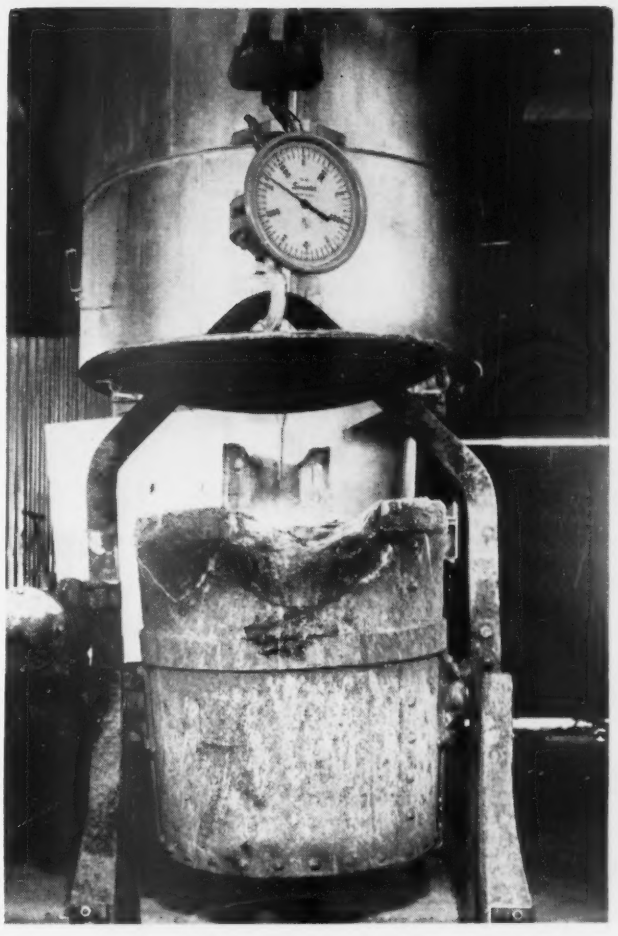


HOW TO POUR CASTINGS WITHOUT GUESSWORK

This steel foundry is using a Martin-Decker SU-20 Sensater hook scale to weigh the molten metal as it pours into the ladle. This way they use only the steel needed for pouring a specific number of castings without risking the expense of running short or having an overage. In the application pictured here, a steel, asbestos-insulated shield protects the Sensater from the intense heat.

This is but one of the hundreds of uses for the versatile Sensater, the only hydraulic crane scale accurate enough to be certified, yet rugged and compact enough to meet industry's exacting demands.

For full particulars, write Martin-Decker Corp., 3431 Cherry Ave., Long Beach 7, Calif., Dept. AI-17.

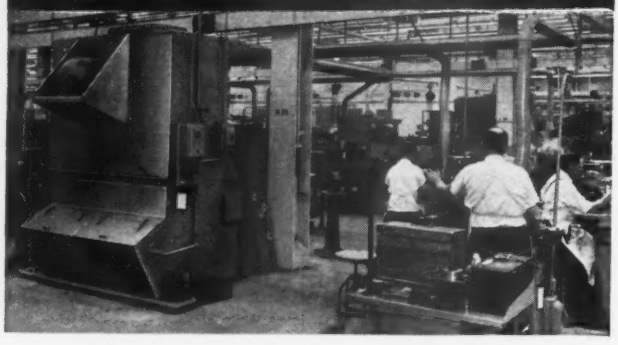
MARTIN-DECKER CORP.

HOME OF THE WEIGHT INDICATOR — LONG BEACH, CALIFORNIA

Circle 755 on Inquiry Card—Page 219

NEWCOMB-DETROIT
EST. 1912

- INDUSTRIAL OVENS
- DUST COLLECTORS
- SPRAY BOOTHS
- PARTS WASHERS



UNI-WASH DUST COLLECTORS

Compact, complete recirculating Water-Type Dust Collectors for industrial processing dusts. Dirt is collected as wet sludge which may be carried away automatically. No moving parts. Extremely efficient for grinding operations. Eliminates danger of explosion from magnesium and aluminum dust. Proven in foundries. Standard Units available.

For Bulletins and Quotations, write to:

NEWCOMB-DETROIT

5755 RUSSELL ST. • DETROIT 11, MICH.

Circle 756 on Inquiry Card—Page 219

PENN BUCKETS

Careful balancing makes Penn Buckets self dumping when loaded and self righting when empty. Welded construction prevents "clinging" makes them empty easily and completely.

WRITE TODAY FOR NEW BULLETIN AND DIMENSION SHEET

No. 4-A
Self-Dumping

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

PENN IRON WORKS, INC.

READING, PENNA.

Circle 758 on Inquiry Card—Page 219

Pinpoint flexible light or powerful 1,000 ft. spotlight—yours automatically at flick of switch. Slide-out probe light extends 10½", reaches around corners, in deep recesses, thru small clearances—gets into hard to reach dark spots for close inspection of products and equipment.

NO. 75 LP LEAKPROOF BATTERIES
A top-quality, long-life battery with leak-proof guarantee on every cell.

ALL THESE EXTRA ADVANTAGES
Powerful fixt-focus 1,000 ft. beam for long range lighting, red "danger zone" lens ring, heavy walled plastic case, 3 way safety switch, detachable end cap with spare bulbs and snap back ring hanger. Write for prices, full details to-day.

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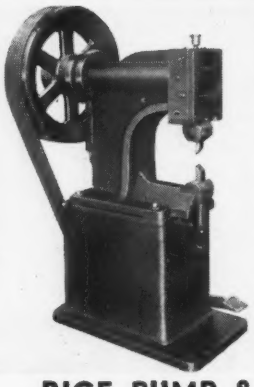

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Sprue Cutter

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Non-Ferrous Foundries

- Cuts Sprues and Gates with One, Swift, Sure Stroke.
- Does away with tedious hand labor.
- Speeds flow of work through cleaning department.
- Built for years of Rugged, Low-Cost Service.
- 2 Sizes, ¾" and 1¼" square. Built-in electric motor or belt drive.

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BETTER CORES

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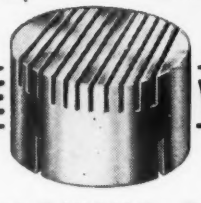

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FOR BLOWING CORES

Sizes from ⅛" to 1" in 1/16" steps — Samples upon request

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Circle 760 on Inquiry Card—Page 219

Master Power

HARD CHROMED • PORTABLE PNEUMATIC TOOLS

DO MORE WORK AT LESS COST

because they deliver more power per cubic foot of air consumed, are light in weight for easier maneuverability and they retain their new tool power longer.

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because they are lighter in weight, better balanced and designed to reduce shock and be free from vibration.

IF YOUR PROBLEM INCLUDES

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THE MASTER PNEUMATIC TOOL COMPANY, INC.

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SALES ★ SERVICE ★ STOCK ★ COAST TO COAST

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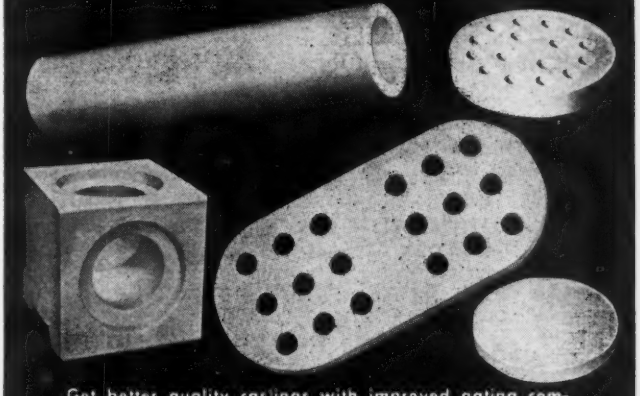

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Circle 764 on Inquiry Card—Page 219

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featuring

INFINITELY VARIABLE SPEED TRANSMISSION

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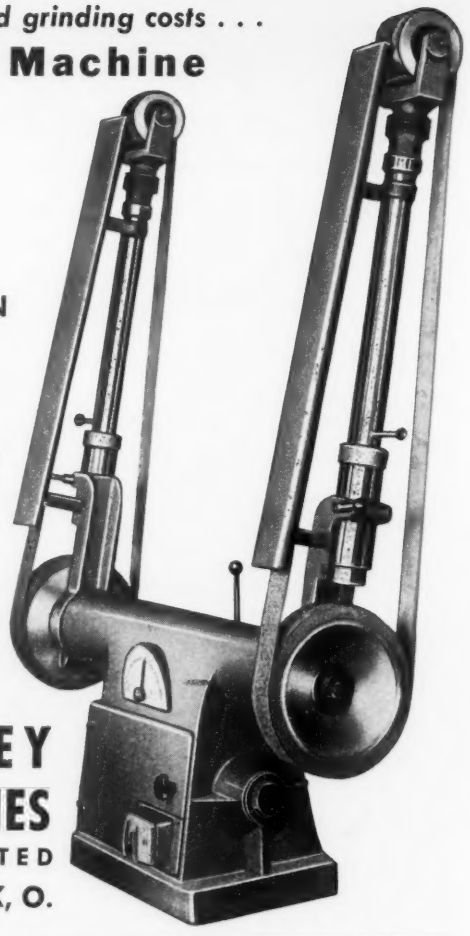

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Controlled Melting Power Offers Higher Profit Margins

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Circle 767 on Inquiry Card—Page 219

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. . . improve worker efficiency!

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Circle 770 on Inquiry Card—Page 219

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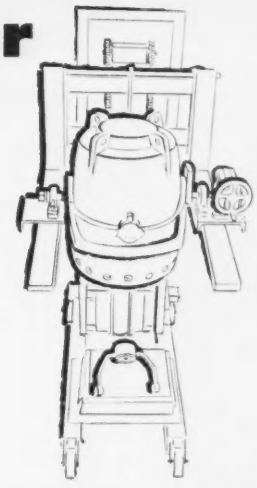
Radiographic

TOOL



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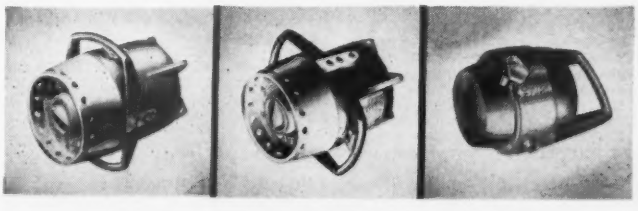

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M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Cleveland Chaplet & Mfg. Co., 26470 Lakeland Blvd., Cleveland 23, Ohio.
Combined Supply & Equipment Co., Inc., 215 Chandler St., Buffalo 7, N. Y.
Crescent Brass & Pin Co., 5766 Trumbull Ave., Detroit, Mich.
Fanner Mfg. Co., Brookside Park, Cleveland 9, Ohio.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Milwaukee Chaplet & Mfg. Co., 1023 S. 40th St., Milwaukee 4, Wis.
Shanafelt Mfg. Co., 3623 Winfield Way, N.E., Canton 5, O.
Smith & Richardson Mfg. Co., Geneva, Ill.
Frederic B. Stevens, Inc., Detroit 16, Mich.

CHEMICALS

General Chemical Division, Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y.
B. F. Goodrich Chemical Co., Rose Bldg., Cleveland 15, Ohio.
Hercules Powder Co., Wilmington 99, Del.
Monsanto Chemical Co., Plastics Div., Springfield 2, Mass.
Olin Mathieson Chemical Corp., Mathieson Bldg., Baltimore 3, Md.
Philadelphia Quartz Co., 1062 Public Ledger Bldg., Philadelphia 6, Pa.

CHILLS

Fanner Mfg. Co., Brookside Park, Cleveland 9, Ohio.
Milwaukee Chaplet & Mfg. Co., 1023 So. 4th St., Milwaukee 4, Wis.
Standard Horse Nail Corp., New Brighton, Pa.

CHILL COATINGS

Acheson Colloids Co., Port Huron, Mich.
Foundry Services, Inc., 200 Bruck St., Columbus 7, Ohio.

CHILL NAILS—See NAILS (chill)

CHIPPERS—See PNEUMATIC TOOLS

CHISELS (Chipping) — See PNEUMATIC TOOLS and CHISELS

CHROMIUM (Briquets)

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 420 Lexington Ave., New York 17, N. Y.
Whitehead Metal Products, 303 West 10th St., New York 6, N. Y.

CLAMPS (Flask)

Black, Sivalls & Bryson, Inc., 7500 E. 12th St., Kansas City 3, Mo.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
Republic Steel Corp., 3100 E. 45th St., Cleveland 27, Ohio.
Shanafelt Mfg. Co., Canton, Ohio.
Sterling Wheelbarrow Co., 1700 W. Walker St., Milwaukee 14, Wis.

CLAY (Bonding)

Baroid Division, 637 Railway Exchange Bldg., 80 East Jackson Blvd., Chicago 4, Ill.
Carpenter Brothers, Inc., 606 West Wisconsin Ave., Milwaukee 3, Wis.
Cedar Heights Clay Co., Oak Hill, Ohio.
Durez Plastics Div. Hooker Electrochemical Co., 1011 Walck Rd., North Tonawanda, N. Y.
Eastern Clay Products Dept. International Minerals & Chemical Corp., 20 N. Wacker Dr., Chicago 6, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Illinois Clay Products Co., Joliet, Ill.
Ironton Fire Brick Co., Ironton, O.
North American Refractories Co., National City Bank Bldg., Cleveland 14, Ohio.
Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

CLAY (Refractory)—See REFRACTORIES

CLEANING—See BLAST CLEANING EQUIPMENT

CLEANING COMPOUNDS

E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Philadelphia Quartz Co., 1062 Public Ledger Bldg., Philadelphia 6, Pa.

CLUTCHES (Magnetic, Friction)

Dings Magnetic Separator Co., 4740 Electric Ave., Milwaukee 7, Wis.
Stearns Magnetic Mfg. Co., 635 S. 28th St., Milwaukee 46, Wis.

COATINGS—See CORE and MOLD WASH

COKE (Oven)

Alabama By-Products Corp., Post Office Box 354, Birmingham 1, Ala.
DeBardeleben Coal Corp., 2201 First Ave., N., Birmingham 3, Ala.
Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, O.
Pickands, Mather & Co., Union Commerce Bldg., Cleveland 14, O.
Pittsburgh Coke & Chemical Co., Grant Building, Pittsburgh 19, Pa.
Republic Coal & Coke Co., 8 So. Michigan Ave., Chicago 3, Ill.
Semet Solvay Div., Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y.

COKE (Petroleum)

Great Lakes Carbon Corp., 579 Fifth Ave., New York 36, N. Y.
Republic Coal and Coke Co., 8 S. Michigan Ave., Chicago 3, Ill.

CONVERTER BLOWERS—See BLOWERS

CONVERTERS (Bessemer)

Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

CONVEYOR DESIGN

Giffels & Vallet, Inc., Marquette Bldg., Detroit, Mich.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.

CONVEYORS (Chain)

Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.
Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.
Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyor Co., 104 Tenth St., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Newaygo Engineering Co., Newaygo, Mich.
Richards-Wilcox Mfg. Co., 174 Third St., Aurora, Ill.
Standard Conveyor Co., North St. Paul 9, Minn.

CONVEYORS (Fabric, Rubber Belt)

Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.
Beardsley & Piper Div. Pettibone Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill.
B. F. Goodrich Co., Akron 18, Ohio.
Great Western Mfg. Co., Leavenworth, Kansas.
Imperial Belting Co., 1800 S. Kilbourn Ave., Chicago 23, Ill.
Jeffrey Mfg. Co., 907-99 N. Fourth Columbus 16, O.
Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.
Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Newaygo Engineering Co., Newaygo, Mich.
Planet Corp., 1820 Sunset, Lansing 6, Mich.
Robins Conveyors Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.
Standard Conveyor Co., North St. Paul 9, Minn.

CONVEYORS (Gravity Roller)

Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyor Co., 104 Tenth St., Ellwood City, Pa.
Standard Conveyor Co., North St. Paul 9, Minn.

CONVEYORS (Live Roller)

Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Standard Conveyor Co., North St. Paul 9, Minn.

CONVEYORS (Magnetic)

Robinson Air Activated Conveyor Systems, 80 Fifth Ave., New York, N. Y.
Stearns Magnetic Inc., 635 South 28th St., Milwaukee 46, Wis.

CONVEYORS (Metal Belt)

May-Fran Engineering, Inc., 1710 Clarkstone Road, Cleveland 12, Ohio.

CONVEYORS (Mold)

Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, O.
Beardsley & Piper Div., Pettibone Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.
Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Newaygo Engineering Co., Newaygo, Mich.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, Ohio.
Planet Corp., 1820 Sunset, Lansing 6, Mich.

CONVEYORS (Overhead Monorail)

American Monorail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 E. 283rd St., Wickliffe, O.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.
Mathews Conveyor Co., 104 Tenth St., Ellwood City, Pa.
Modern Equipment Co., Port Washington, Wis.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Penn Iron Works Inc., Reading, Pa.
Planet Corp., 1820 Sunset, Lansing 6, Mich.
Richards-Wilcox Mfg., 174 Third St., Aurora, Ill.
Whiting Corp., Harvey, Ill.

CONVEYORS (Pneumatic)

Fuller Company, Catasaugua, Pa.

CONVEYORS (Portable)

Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.

CONVEYORS (Vibrating, Oscillating)

Ajax Flexible Coupling Co., Westfield, N. Y.
Carrier Conveyor Corp., Frankfort Ave. at Clifton, Louisville 6, Ky.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.
Robins Conveyors Div., Hewitt-Robins Inc., 270 Passiac Ave., Passaic, N. J.
Simplicity Engineering Co., Durand, Mich.

COPPER

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.

COPPER SHOT

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.

CORE BINDERS

Acme Resin Corp., Forest Park, Ill.
American Gum Products Co., 500 Fifth Ave., New York 18, N. Y.
Archer-Daniels-Midland Co., Foundry Products Div., 2191 W. 110th St., Cleveland 2, O.
M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
The Borden Co., Thor Division, 350 Madison Ave., New York 17, N. Y.
Carver Foundry Products Co., Muscatine, Iowa.
Cities Service Oil Co., 20 N. Wacker Dr., Chicago 6, Ill.
Corn Products Refining Co., 17 Battery Pl., New York 4, N. Y.
Delhi Foundry Sand Co., Sayler Park Station, Cincinnati 33, Ohio.
Delta Oil Products Co., Milwaukee 9, Wis.
E. I. Du Pont de Nemours & Co. Inc., Wilmington 98, Delaware.
Durez Plastics Div. Hooker Electrochemical Co., 1011 Walck Rd., North Tonawanda, N. Y.
Eastern Clay Products Dept. International Mineral & Chemical Corp., 20 N. Wacker Drive, Chicago 6, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Rubber Inc., 6100 River Rd., Washington 16, D. C.
Foundry Services, Inc., 2000 Bruck
General Electric Co., St., Columbus 7, Ohio. Chemical Materials Dept., 1 Plastics Ave., Pittsfield, Mass.
B. F. Goodrich Chemical Co., Rose Building, Cleveland 15, Ohio.
Hercules Powder Co., Wilmington 99, Del.
E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Monsanto Chemical Co., Plastics Division, Springfield 2, Mass.
Penola Oil Co., 14300 McNichols Rd., West, Detroit 35, Mich.
Philadelphia Quartz Co., 1062 Public Ledger Bldg., Philadelphia 6, Pa.
Reichhold Chemical Co., 525 North Broadway, White Plains, N. Y.
Robeson Process Co., 500 Fifth Ave., New York 18, N. Y.
Schenectady Resins, P.O. Box 1046, Schenectady, N. Y.
Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.
G. E. Smith, Inc., 246 Washington Rd., Pittsburgh 16, Pa.
Frederic B. Stevens, Inc., Detroit 16, Mich.
Thiem Products Co., 9800 West Rogers, Milwaukee 14, Wis.
United Oil Co., Erie, Pa.
Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

CORE BLOWER BUSHINGS

Eastern Clay Products Dept. International Minerals & Chemical Corp., 20 N. Wacker Drive, Chicago 6, Ill.

CORE BLOWING MACHINES

Beardsley & Piper Div. Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Champion Div. Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Carver Foundry Products Co., Muscatine, Iowa.
Wm. Demmler & Bros. Kewanee, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
International Molding Machine Co., LaGrange Park, Ill.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
Redford Iron & Equipment Co., 20733 Glendale Ave., Detroit 23, Mich.

COREBOXES

Accurate Match Plate Co., 1847 W. Carroll St., Chicago, Ill.

CORE DRAWING MACHINES

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

CORE DRIERS

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

CORE GRINDERS (Power Operated)

Milwaukee Foundry Equipment Div., Spo Inc., 3328 Pierce St., Milwaukee 4, Wis.
Sutter Products Co., Dearborn, Mich.

CORE KNOCKOUT MACHINES

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Beardsley & Piper Div. Pettibone-Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill.
Chicago Pneumatic Tool Co., 6 E. 44th St., New York 17, N. Y.
Pangborn Corp., Hagerstown, Md.
Simplicity Engineering Co., Durand, Mich.

COREMAKING MACHINES

Beardsley & Piper Div. Pettibone-Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Champion Div. Pettibone-Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill.
Davenport Machine & Foundry Co., Davenport, Iowa.
Wm. Demmler & Bros., Kewanee, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
International Molding Machine Co., LaGrange Park, Ill.
Johnston & Jennings Div. Pettibone-Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Milwaukee Foundry Equipment Div., Spo Inc., 3328 Pierce St., Milwaukee 4, Wis.
Redford Iron & Equipment Co., 20733 Glendale Ave., Detroit 23, Mich.
Sutter Products Co., Dearborn, Mich.
Tabor Mfg. Co., Div. Turbo Machine Co., Lansdale, Pa.

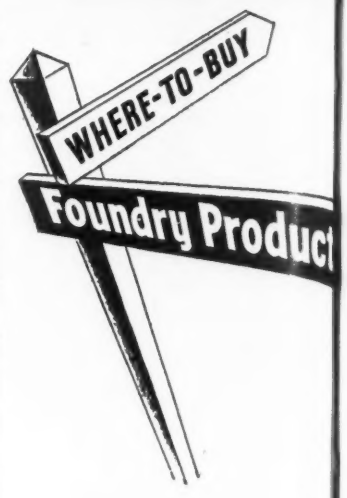
CORE OILS—See CORE BINDERS

CORE and MOLD OVENS

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, O.
Despatch Oven Co., 619 Eighth St., S.E., Minneapolis 14, Minn.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, O.
Girdler Corp., Thermex Division, 224 E. Broadway, Louisville 2, Ky.
Holcroft & Company, 6545 Epworth Blvd., Detroit 10, Mich.
Kirk & Blum Mfg. Co., 3108 Forrer St., Cincinnati 9, Ohio.
Lanly Company, 750 Prospect Ave., Cleveland 15, O.
Michigan Oven Co., 419 Brainard St., Detroit 1, Mich.
Newcomb-Detroit Co. 5741 Russell St. Detroit 11, Mich.
J. O. Ross Engineering Corp., 444 Madison Ave., New York 17, N.Y.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.
Frederic B. Stevens, Inc., 18th St. & Vernor Highway, Detroit 16, Mich.
Stroman Furnace & Engineering, Div. of Petersen Oven Co., 9900 Franklin Ave., Franklin Park, Ill.

CORE PASTE

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Corn Products Refining Co., 17 Battery Pl., New York 4, N. Y.
Delta Oil Products Co., Milwaukee 9, Wis.
Eastern Clay Products, Dept. International Minerals & Chemical Corp. 20 N. Wacker Drive, Chicago 6, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundries Materials Co., Coldwater, Mich.
Foundry Services, Inc., 2000 Bruck St., Columbus 7, Ohio.



Frederic B. Stevens, Inc., 18th St. & Vernor Highway, Detroit 16, Mich.
Thiem Products Co., 9800 West Rogers, Milwaukee 14, Wis.
Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

CORE PLATES (Steel, Aluminum, Magnesium, Asbestos)

Black, Sivalls & Bryson, Inc., 7500 E. 12th St., Kansas City 6, Mo.
Christiansen Corp., 210 South Marion, Oak Park 1, Ill.
Champion Division, Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Crescent Brass & Pin Co., 5766 Tramrail Ave., Detroit, Mich.
Johns-Manville, 22 E. 40th St., New York 16, N. Y.
Republic Steel Corp., 3100 E. 45th St., Cleveland 27, Ohio.
Shanafelt Mfg. Co., 3623 Winfield Way, N.E., Canton 5, Ohio.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
West Way Pattern & Mfg. Co., 9617 Clinton Rd., Cleveland 9, Ohio.

CORE ROD STRAIGHTENING and CUTTING MACHINERY

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Kane & Roach, Syracuse, N. Y.
Wheelabrator Corp., Mishawaka, Ind.

CORE SAND—See SAND

CORE SAND MIXERS—See SAND PREPARATION EQUIPMENT

CORE STRIPPERS—See CORE DRAWING MACHINES

CORE TESTING EQUIPMENT

Detroit Testing Machine Co., 19390 Grinnell Ave., Detroit 13, Mich.
Harry W. Dietert Co., 9330 Roselawn Ave., Detroit 4, Mich.
Claud S. Gordon Co., 3000 So. Wallace, Chicago 16, Ill.

CORE TRUCKS—See TRUCKS (Core)

CORE VENTS

Demmler, Wm., & Bros., Kewanee, Ill.
Smillie, C. M., & Co., 1124 Woodward Heights Blvd., Ferndale 20, Mich.

CORE and MOLD WASH

Acheson Colloids Co., Port Huron, Mich.
M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Carborundum Co., Perth Amboy, N. J.

Cities Service Oil Co., 20 N. Wacker Dr., Chicago 6, Ill.
Corn Products Refining Co., 17 Battery Pl., New York City 4.
Delta Oil Products Co., Milwaukee 9, Wis.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Rubber Inc., 6100 River Road, Washington 16, D. C.
Foundry Services, Inc., 2000 Bruck St., Columbus, Ohio.
Foundries Materials Co., Coldwater, Mich.
E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Mullite Refractories, Shelton, Conn.
National Carbon Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N.Y.
Pennsylvania Pulverizing Co., 140 Stanwix St., Pittsburgh 22, Pa.
Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.
Stevens, Frederic B., Inc., Detroit 26, Mich.
Thiem Products Co., 9800 West Rogers, Milwaukee 14, Wis.
Titanium Alloy Mfg. Div. National Lead Co., 111 Broadway, New York 6, N. Y.
United Oil Co., Erie, Pa.
United States Graphite Co., Saginaw, Mich.
Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

CORE WIRES

Crescent Brass & Pin Co., 5766 Trumbull Ave., Detroit, Mich.

CORES (Strainer, Ceramic)

Delhi Foundry Sand Co., Sayler Park Station, Cincinnati 33, Ohio.
Louthan Corp., East Liverpool, Ohio.
Porcelain Products, Inc., Findlay, Ohio.
Universal Clay Products, Sandusky, Ohio.

COUPLINGS (Air, Hydraulic)

Aeroquip Corp., Jackson, Mich.
Chicago Pneumatic Tool Co., 6 E. 44th St., New York 17, N.Y.
Cleco Division of Reed Roller Bit Co., Houston, Tex.
C. B. Hunt & Sons Inc., Salem, Ohio.
A. Schrader's Son, 470 Vanderbilt Ave., Brooklyn 17, N. Y.

COUPLINGS (Flexible, Shaft)

Ajax Flexible Coupling Co., Westfield, N. Y.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.

CRANES (Bucket)

Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANES (Gantry)

Cleveland Tramrail Div. of Cleveland Crane & Engineering Co. Wickliffe, Ohio.
Modern Equipment Co., Port Washington, Wis.

CRANES (Jib)

American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.
Chisholm-Moore Hoist Div. Columbus-McKinnon Chain Corp., Tonawanda, New York.
Cleveland Tramrail Div., of Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Industrial Crane & Hoist Corp., 1536 South Paulina St., Chicago 8, Ill.
Modern Equipment Co., Port Washington, Wis.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANES (Monorail—Electric and Hand)

American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.
Chisholm-Moore Hoist Div. Columbus-McKinnon Chain Corp., Tonawanda, New York.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Erie Strayer Co., Erie, Pa.
Industrial Crane & Hoist Corp., 1536 South Paulina St., Chicago 8, Ill.
Modern Equipment Co., Port Washington, Wis.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANES (Self-Propelled)

Baker-Raulang Company, 1250 West 80th St., Cleveland 2, Ohio.
Coles Cranes Inc., Joliet, Ill.
Modern Equipment Co., Port Washington, Wis.
Silent Hoist & Crane Co., 835 63rd St., Brooklyn 20, N. Y.

CRUCIBLES

Ajax Electrothermic Corp., Trenton, N. J.
M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Dixon, Joseph, Crucible Co., Jersey City, N. J.
Lava Crucible Co., Pittsburgh, Pa.
National Carbon Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Ross-Tacony Crucible Co., Tacony, Philadelphia, Pa.
Vesuvius Crucible Co., Swissvale, Pa.

CRUCIBLE POURING DEVICES

Modern Equipment Co., Port Washington, Wis.

CRUSHERS (Core)

Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, Ohio.
Newaygo Engineering Co., Newaygo, Mich.
Simplicity Engineering Co., Durand, Mich.

CUPOLAS

Modern Equipment Co., Port Washington, Wis.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CUPOLAS (Hot Blast Equipment)

E. S. Harman Corp., 205 West Wacker Drive, Chicago 6, Ill.
Modern Equipment Co., Port Washington, Wis.
J. O. Ross Engineering Corp., 444 Madison Ave., New York 17, N.Y.

CUPOLA BLOWERS

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Spencer Turbine Co., Hartford, Conn.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CUPOLA CHARGING MACHINES

American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, O.
Modern Equipment Co., Port Washington, Wis.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CUPOLA CONTROL EQUIPMENT

Foxboro Company, Foxboro, Mass.

CUPOLA DUST ARRESTORS—See DUST COLLECTING, VENTILATING, EXHAUST, COOLING SYSTEMS

CUPOLA LIGHTERS

Hauck Mfg. Co., 106 Tenth St., Brooklyn 15, N. Y.
Hickman-Williams Co., Union Commerce Bldg., Cleveland 14, Ohio.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CUPOLA LININGS—See REFRACTORIES

CUPOLA PATCHING GUNS—See REFRACTORY GUNS

CUTOFF MACHINES (Abrasive)

DoAll Co., Des Plaines, Ill.
Fox Grinders Inc., Oliver Bldg., Pittsburgh, Pa.
Tabor Mfg. Co., Div. Turbo Machine Co., Lansdale, Pa.

CUTOFF WHEELS

Bay State Abrasive Products Co., Westboro, Mass.
Carborundum Co., Perth Amboy, N. J.
Electro Metallurgical Co., Div. of Union Carbide & Carbon Corp., 420 Lexington Ave., New York 17, N. Y.
Electro Refractories & Abrasives Corp., Vars Bldg., Buffalo 2, N. Y.
Macklin Company, Jackson, Mich.
Norton Company, Worcester 6, Mass.
Raybestos-Manhattan, Inc. Manhattan Rubber Division, Passaic, N. J.
Simonds Abrasive Co., Tacony & Fraley Sts., Philadelphia 37, Pa.

CUTTING OILS

E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.

CYLINDERS (Air)

Airmatic Valve, Inc., 7317 Associate Ave., Cleveland 9, Ohio.
Hanna Engineering Works, 1765 Elston Ave., Chicago 22, Ill.
Miller Fluid Power Co., 2040 North Hawthorne, Melrose Park, Ill.

CYLINDERS (Hydraulic)

Airmatic Valve, Inc., 7317 Associate Ave., Cleveland 9, Ohio.
Miller Fluid Power Co., 2040 North Hawthorne, Melrose Park, Ill.

DARK ROOM ACCESSORIES—See X-RAY FILM and ACCESSORIES

DEGASIFIERS and DEOXIDIZERS

Cleveland Flux Co., 1026 Main St., Cleveland 13, O.
Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.
Foundry Services, Inc., 2000 Bruck St., Columbus, Ohio.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.

DESIGN TESTING

Magnaflux Corp., 7300 West Lawrence Ave., Chicago 31, Ill.

DESULPHURIZERS

Carpenter Brothers Inc., 606 W. Wisconsin Ave., Milwaukee 3, Wis.
Cleveland Flux Co., 1026 Main St., Cleveland 13, O.
Columbia-Southern Chemical Corp., Div., Pittsburgh Plate Glass Co., Pittsburgh 19, Pa.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Services, Inc., 2000 Bruck St., Columbus 7, Ohio.
Hercules Powder Co., Wilmington 99, Del.
Modern Equipment Co., Port Washington, Wis.
Olin Mathieson Chemical Corp., 60 Mathieson Bldg., Baltimore 3, Md.
Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.
Solvay Process Division, Allied Chemical & Dye Corp., 61 Broadway, New York 6, N. Y.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

DOWEL PINS

Standard Horse Nail Corp., New Brighton, Pa.

DRILLS (Electric)

Chicago Pneumatic Tool Co., 6 E. 44th St., New York 17, N. Y.

DRILLS (Pneumatic)

Chicago Pneumatic Tool Co., 6 E. 44th St., New York 17, N. Y.
Gardner-Denver Co., Quincy, Ill.
Schramm Inc., West Chester, Pa.

DRIVES (Gear, Variable Speed)

Link-Belt Co., Prudential Plaza, Chicago 1, Ill.

DRUMS (Magnetic)—See SEPARATORS (Magnetic)

DUMP HOPPERS

Kirk & Blum Mfg. Co., 3108 Forrer St., Cincinnati 9, O.
Roura Iron Works, 1405 Woodland Ave., Detroit 11, Mich.

DUMP TRUCKS

Kwik-Mix Co., 3026 West Concordia, Milwaukee 16, Wis.
Prime Mover Co., Muscatine, Iowa.
Tractomotive Corp., Deerfield, Ill.

DUST COLLECTING, VENTILATING, EXHAUST, COOLING SYSTEMS

American Air Filter Co., Inc., 266 Central Ave., Louisville 8, Ky.
Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, O.
Chicago Blower Corp., 9867 Pacific Ave., Franklin Park, Ill.
Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.
Kirk & Blum Mfg. Co., 3108 Forrer St., Cincinnati 9, Ohio.
Martin Equipment Co., P.O. Box 173, Wabash, Ind.
Newcomb-Detroit Co., 5741 Russell St., Detroit 11, Mich.
Pangborn Corp., Hagerstown, Md.
J. O. Ross Engineering Corp., 444 Madison Ave., New York 17, N. Y.
Schneible Co., Claude B., 212 Stephenson Bldg., P.O. Box 81, North End Station, Detroit 2, Mich.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.
Standard Electrical Tool Co., 2488 River Road, Cincinnati 4, Ohio.
Tabor Mfg. Co., Div. Turbo Machine Co., Lansdale, Pa.
Wheelabrator Corp., Mishawaka, Ind.

ELECTRIC FURNACES (See Furnaces, Electric)

ELECTRODES (Graphite and Amorphous)

Great Lakes Carbon Corp., 579 Fifth Ave., New York 36, N. Y.
National Carbon Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., 30 E. 42nd St., New York 17, N. Y.

ELEVATORS (Bucket)

Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, O.
Great Western Mfg. Co., Leavenworth, Kansas.
Jeffrey Mfg. Co., Columbus 16, O.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Newaygo Engineering Co., Newaygo, Mich.
Robins Conveyors Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.

ELEVATORS (Pneumatic, Material Handling)

Fuller Co., Catasauqua, Pa.

ENGINEERING SERVICE (Foundry)

Edwin S. Carman, 1643 Lee Road, Cleveland 18, Ohio.
Commercial Contracting Corp., 12160 Cloverdale, Detroit, Mich.
Giffels & Vallet, Inc., Marquette Bldg., Detroit, Mich.

Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, Ohio.

Lester B. Knight & Associates, Inc., 549 West Randolph St., Chicago 6, Ill.

Link-Belt Co., Prudential Plaza, Chicago 1, Ill.

Walley & Associates, 323 Third National Bldg., Dayton 2, Ohio.

Westover Corp., 3110 W. Fond du Lac Avenue, Milwaukee 10, Wis.

EXHAUST—See DUST COLLECTING, VENTILATING, EXHAUST, COOLING SYSTEMS

FABRICATORS (Metal)

Kirk & Blum Mfg. Co., 3108 Forrer St., Cincinnati 9, Ohio.

Modern Equipment Co., Port Washington, Wis.

Newaygo Engineering Co., Newaygo, Mich.

Penn Iron Works, Inc., Reading, Pa.

Roura Iron Works, 1405 Woodland Ave., Detroit 11, Mich.

FACINGS

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.

Delta Oil Products Co., Milwaukee 9, Wis.

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

Foundry Services, Inc., 2000 Bruck St., Columbus 7, Ohio.

National Carbon Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

Stevens Inc., Frederic B., Detroit 16, Mich.

United States Graphite Co., Saginaw, Mich.

Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

FANS—See DUST COLLECTING, VENTILATING, EXHAUST, COOLING SYSTEMS

FASTENERS (Conveyor Belt)

Flexible Steel Lacing Co., 4667 Lexington St., Chicago 44, Illinois.

FEEDERS (Belt)

Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.

Link-Belt Co., Prudential Plaza, Chicago 1, Ill.

Robins Conveyors, Div. Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.

FEEDERS (Rotary)

Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.

Fuller Company, Catasauqua, Pa.

Great Western Mfg. Co., Leavenworth, Kansas.

Link-Belt Co., Prudential Plaza, Chicago 1, Ill.

Newaygo Engineering Co., Newaygo, Mich.

FEEDERS (Vibrating)

Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.

Carrier Conveyor Corp., Frankfort Ave. at Clifton, Louisville 6, Ky.

Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.

Link-Belt Co., Prudential Plaza, Chicago 1, Ill.

Robins Conveyors, Div. Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.

Simplicity Engineering Co., Durand, Mich.

FERROBORON

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 420 Lexington Ave., New York 17, N. Y.

Whitehead Metal Products, 303 West 10th St., New York 14, N. Y.

FERROCHROME

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 420 Lexington Ave., New York 17, N. Y.

Ohio Ferro Alloys Corp., Canton 9, Ohio.

Pickands, Mather & Co., Union Commerce Bldg., Cleveland 14, Ohio.

Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

Whitehead Metal Products, 303 West 10th St., New York 14, N. Y.

FERROCOLUMBIUM

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 420 Lexington Ave., New York 17, N. Y.

Whitehead Metal Products, 303 West 10th St., New York 14, N. Y.

FERROMANGANESE

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 420 Lexington Ave., New York 17, N. Y.

Ohio Ferro Alloys Corp., Canton 9, Ohio.

FERROMOLYBDENUM

Climax Molybdenum Co., 500 Fifth Ave., New York 36, N. Y.

FERROPHOSPHORUS

Eastern Clay Products Dept., International Minerals & Chemical Corp., 20 N. Wacker Drive, Chicago 6, Ill.

Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, Ohio.

FERROSILICON

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 420 Lexington Ave., New York 17, N. Y.

Keokuk Electro Metals Co., 429 So. 4th St., Keokuk, Iowa.

Miller & Company, 332 S. Michigan Ave., Chicago 4, Ill.

Ohio Ferro Alloys Corp., Canton 9, Ohio.

Pickands, Mather & Co., Union Commerce Bldg., Cleveland 14, Ohio.

Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

FERROTITANIUM

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 420 Lexington Ave., New York 17, N. Y.

Titanium Alloy Mfg. Div. National Lead Co., 111 Broadway, New York 6, N. Y.

Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

FERROTUNGSTEN

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 420 Lexington Ave., New York 17, N. Y.

FERROVANADIUM

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 420 Lexington Ave., New York 17, N. Y.

Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

FILES (Rotary)

Essex Rotary File & Tool Corp., 295 Madison Ave., New York 17, N. Y.

FILTERS (Air)

American Air Filter Co., 266 Central Ave., Louisville 8, Ky.

FIRE BRICK, CLAY, SAND, STONE—See REFRACTORIES

FITTINGS (Pipe)

Pipe Line Development Co., 5700 Detroit, Cleveland, Ohio.

FLASK BANDS—See BANDS (Snap Flask)

FLASK BUSHINGS, PINS and FITTINGS

The Adams Co., Dubuque, Iowa.

Black, Sivalls & Bryson, Inc., 7500 E. 12th St., Kansas City 6, Mo.

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.

Republic Steel Corp., 3100 E. 45th St., Cleveland 27, Ohio.

Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio.

Smillie & Co., C. M., 1124 Woodward Hgts. Blvd., Ferndale 20, Mich.

Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

Universal Engineering Co., Frankenmuth, Mich.

FLASK FILLERS

Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, Ohio.

Beardsley & Piper Div. Pettibone Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill.

Jeffrey Mfg. Co., Columbus 16, O.

FLASK LIFT MACHINES—See PATTERN DRAW MACHINES

FLASKS (Aluminum, Magnesium)

Adams Co., Dubuque, Iowa.

Fremont Flask Co., Fremont, O.

Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.

FLASKS (Slip)

Adams Co., Dubuque, Iowa.

Fremont Flask Co., Fremont, O.

Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.

FLASKS (Snap)

Adams Co., Dubque, Iowa.

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, Ohio.

Fremont Flask Co., Fremont, O.

Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.

Stevens, Inc., Frederic B., Detroit 16, Mich.

FLASKS (Steel)

Black, Sivalls & Bryson, Inc., 7500 E. 12th St., Kansas City 6, Mo.

Republic Steel Corp., 3100 E. 45th St., Cleveland 27, Ohio.

Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio.

Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

FLASKS (Wood)

Adams Co., Dubuque, Iowa.

FLOORING (Non-Slip)

Norton Co., Worcester 6, Mass.

FLUXES

Cleveland Flux Co., 1026 Main St., Cleveland 13, Ohio.

Delhi Foundry Sand Co., Sayler Park Station, Cincinnati 33, Ohio.

Foundry Services, Inc., 2000 Bruck St., Columbus, Ohio.

General Chemical Division, Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y.

Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, Ohio.

Olin Mathieson Chemical Corp., Mathieson Bldg., Baltimore 3, Md.

Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.

FLUXES (Soldering, Welding and Tinning)

Linde Air Products Co., Div. Union Carbide & Carbon Corp., 420 Lexington Ave., New York 17, N. Y.

FOUNDRY ENGINEERS (See ENGINEERING SERVICE)

FOUNDRY LAYOUT and METHODS (See ENGINEERING SERVICE)

FOUNDRY NAILS

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.

Crescent Brass & Pin Co., 5766 Trumbull Ave., Detroit, Mich.

Standard Horse Nail Corp., New Brighton, Pa.

FOUNDRY SUPPLY HOUSES

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.

Combined Supply & Equipment Co., Inc., 215 Chandler St., Buffalo 7, N. Y.

Eastern Clay Products, Dept., International Minerals & Chemical Corp., 20 N. Wacker Drive, Chicago 6, Ill.

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

Foundries Materials Co., Coldwater, Mich.

Foundry Services, Inc., 2000 Bruck St., Columbus 7, Ohio.

Stevens, Inc., Frederic B., Detroit 16, Mich.

Thiem Products Co., 9800 West Rogers, Milwaukee 14, Wis.

FURNACE BLOWERS—See BLOWERS

FURNACE LINING—See REFRACTORIES

FURNACES (Air)

Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Electric Melting)

Ajax Electrothermic Corp., Trenton, N. J.

Ajax Engineering Corp., Trenton, N. J.

American Bridge Co., Div. United States Steel Corp., 525 Wm. Penn Place, Pittsburgh 19, Pa.

Detroit Electric Furnace Div. of Kuhlman Electric Co., Bay City, Mich.

Inductotherm Corp., 412 Illinois Ave., Delanco, New Jersey.

Lectromelt Furnace Co. Div. McGraw Electric Co., P.O. Box 1125, Pittsburgh, Pa.

Ohio Crankshaft Co., Tocco Division, 4620 E. 71st St., Cleveland 5, Ohio.

Swindell-Dressler, Pittsburgh, Pa.

Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Gas or Oil Fired Melting)

Campbell-Hausfeld Co., Harrison, O.

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.

Despatch Oven Co., 619 Eighth St., S.E., Minneapolis 14, Minn.

Electric Furnace Co., West Wilson St., Salem, Ohio.

Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

Holcroft & Company, 6545 Epworth Blvd., Detroit 10, Mich.

Johnston Mfg. Co., Minneapolis 13, Minn.

Lanly Company, 750 Prospect Ave., Cleveland 15, Ohio.

Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.

Reda Pump Co., Bartlesville, Okla.

Stroman Furnace & Engineering Co., Div. of Petersen Oven Co., 9900 Franklin Ave., Franklin Park, Ill.

FURNACES (Heat Treating and Annealing)

Ajax Electric Co., Inc., Philadelphia 23, Pa.

Ajax Electrothermic Corp., Trenton, N. J.

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.

Despatch Oven Co., 619 Eighth St., S.E., Minneapolis 14, Minn.

Electric Furnace Co., West Wilson St., Salem, Ohio.

Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

General Electric Co., Schenectady, N. Y.

Holcroft & Company, 6545 Epworth Blvd., Detroit 10, Mich.

Johnston Mfg. Co., Minneapolis 13, Minn.

Lanly Company, 750 Prospect Ave., Cleveland 15, Ohio.

Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.

Ohio Crankshaft Co., Tocco Division, 4620 E. 71st St., Cleveland 5, Ohio.

Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

GAGGERS

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

GAS (Oxygen, Acetylene, Carbon Dioxide, Industrial)

Air Reduction Sales Co., 150 East 42nd St., Socony Mobil Bldg., New York 17, N. Y.

Foundry Services, Inc., 2000 Bruck St., Columbus 7, Ohio.

Linde Air Products Co., Div. Union Carbide & Carbon Corp., 420 Lexington Ave., New York 17, N. Y.

Liquid Carbonic Corp., 3110 S. Kedzie Ave., Chicago 23, Ill.

Pure Carbonic Div., Air Reduction Co., 60 East 42nd St., New York 17, N. Y.

GAS BURNERS—See BURNERS

GENERATORS (Acetylene)

Linde Air Products Co., Div. Union Carbide & Carbon Corp., 420 Lexington Ave., New York 17, N. Y.

GLOVES—See SAFETY CLOTHING

GOGGLES and EYE PROTECTORS

American Optical Co., Southbridge, Mass.

Chicago Eye Shield Co., 2300 West Warren, Chicago 12, Ill.

GRAPHITE and GRAPHITE BRIQUETS

Acheson Colloids Co., Port Huron, Mich.

Becker Bros. Carbon Co., 3450 South Laramie, Cicero, Ill.

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

Great Lakes Carbon Corp., 579 Fifth Ave., New York 36, N. Y.

National Carbon Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

Frederic B. Stevens, Inc., Detroit 16, Mich.

United States Graphite Co., Saginaw, Mich.

GRINDERS (Electric Portable)

Chicago Pneumatic Tool Co., 6 East 44th St., New York 17, N. Y.

Standard Electrical Tool Co., 2488 River Road, Cincinnati 4, Ohio.

Thor Power Tool Co., Aurora, Ill.

GRINDERS (Pneumatic Portable)

Aro Equipment Corp., Bryan, Ohio.

Chicago Pneumatic Tool Co., 6 East 44th St., New York 17, N. Y.

Cleco Pneumatic Tool Div., Reed Roller Bit Co., Houston, Tex.

Master Pneumatic Tool Co., Inc., Orwell, Ohio.

Thor Power Tool Co., Aurora, Ill.

GRINDERS (Surface, Bench, Disc, Floor)

Carborundum Co., Niagara Falls, N. Y.

DoAll Co., Inc., Des Plaines, Ill.

Fox Grinders Inc., Oliver Bldg., Pittsburgh 22, Pa.

Standard Electrical Tool Co., 2488 River Road, Cincinnati 4, Ohio.

Thor Power Tool Co., Aurora, Ill.

GRINDERS (Swing Frame)

Fox Grinders, Inc., Oliver Bldg., Pittsburgh 22, Pa.

Sutter Products Co., Dearborn, Mich.

GRINDING WHEELS

Bay State Abrasive Products Co., Westmoro, Mass.

Carborundum Co., Niagara Falls, N. Y.

Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

Keystone Abrasive Wheel Co., Carnegie, Pa.

Macklin Co., Jackson, Mich.

Mid West Abrasive Co., Owosso, Michigan.

Norton Company, Worcester 6, Mass.

Peninsular Grinding Wheel Co., 729 Meldrum Ave., Detroit, Mich.

Raybestos-Manhattan, Inc., Manhattan Rubber Division, Passaic, N. J.

Simonds Abrasive Co., Tacony & Fraley Sts., Philadelphia 37, Pa.

United States Rubber Co., 4300 New Haven Ave., Fort Wayne 4, Ind.

GRINDING WHEEL DRESSERS

Carborundum Co., Niagara Falls, N. Y.

Desmond-Stephen Mfg. Co., Urbana, O.

Norton Co., Worcester, Mass.

GRINDSTONES—See GRINDING WHEELS

GRIT—See SHOT and GRIT

HAMMERS (Chipping)—See PNEUMATIC TOOLS and CHISELS

HARDNESS TESTING EQUIPMENT

Detroit Testing Machine Co., 19390 Grinnell Ave., Detroit 13, Mich.

Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.

King Tester Corp., 440 North 13th St., Philadelphia 23, Pa.

Steel City Testing Machines Inc., 8817 Lyndon, Detroit 21, Mich.

HEAT CONTROL AND RECORDING DEVICES

Claud S. Gordon Co., 3000 So. Wallace, Chicago 16, Ill.

Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.

Marshall Co., L. H., 270 W. Lane, Columbus 14, O.

HEATERS (High Frequency Electric)

Ajax Electrothermic Corp., Trenton, N. J.

HEATERS (Space, Unit, Oven, Water)

American Air Filter Co. Inc., Louisville 8, Ky.

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.

Despatch Oven Co., 619 Eighth St., S.E., Minneapolis 14, Minn.

Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

Lanly Co., 750 Prospect Ave., Cleveland 15, Ohio.

Newcomb-Detroit Co., 5741 Russell St., Detroit 11, Mich.

Scheu Products, Upland, Calif.

HELMETS (Blasting)

American Optical Co., Southbridge, Mass.

W. W. Sly Mfg. Co., 4753 Train

Pangborn Corp., Hagerstown, Md. Ave., Cleveland 2, Ohio.

Wheelabrator Corp., Mishawaka, Ind.

HELMETS (Welding)

American Optical Co., Southbridge, Mass.

HOISTS (Air)

Aro Equipment Corp., Bryan, Ohio.

Chicago Pneumatic Tool Co., 6 East 44th St., New York 17, N. Y.

Curtis Pneumatic Machinery Div. Curtis Mfg. Co., 1905 Kienlen Ave., St. Louis 20, Mo.

Gardner-Denver Co., Quincy, Ill.

Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.

Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.

Miller Fluid Power Co., 2040 North Hawthorne, Melrose Park, Ill.

HOISTS (Chain, Hand)

Chisholm-Moore Hoist Div. Columbus-McKinnon Chain Corp., Tonawanda, New York.

Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.

Manning, Maxwell & Moore, Inc., Muskegon, Mich.

Modern Equipment Co., Port Washington, Wis.

HOISTS (Electric)

Chisholm-Moore Hoist Div. Columbus-McKinnon Chain Corp., Tonawanda, New York.

Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.

Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.

Manning, Maxwell & Moore, Inc., Muskegon, Mich.

Modern Equipment Co., Port Washington, Wis.

HOISTS (Skip)

Beardsley & Piper Div., Pettibone Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill.

Gardner-Denver Co., Quincy, Ill.

Link-Belt Co., Prudential Plaza, Chicago 1, Ill.

Modern Equipment Co., Port Washington, Wis.

National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

Newaygo Engineering Co., Newaygo, Mich.

Robins Conveyors Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.

Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

HOODS (Shakeout, Pouring and Cooling)—See DUST COLLECTING, VENTILATING, EXHAUST, COOLING SYSTEMS

HOSE (Air, Blasting, Water, Gas)

Aeroquip Corp., Jackson, Mich.

Gardner-Denver Co., Quincy, Ill.

B. F. Goodrich Co., Akron, Ohio.

Hewitt Rubber Div., Hewitt-Robins Inc., 240 Kensington Ave., Buffalo 5, N. Y.

Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.

Pangborn Corp., Hagerstown, Md.

Quaker Rubber Div. H. K. Porter Co., Tacony & Comly Sts., Philadelphia 24, Pa.

Raybestos-Manhattan, Inc., Manhattan Rubber Div., Passaic, N. J.

Schramm Inc., West Chester, Pa.

HOSE FITTINGS and REELS

Aeroquip Corp., Jackson, Mich.

A. Schrader's Son, 417 Vanderbilt Ave., Brooklyn 17, N. Y.

HOT TOP MATERIALS—See RISER COMPOUNDS

HYDRAULIC CLEANING—See BLAST CLEANING EQUIPMENT

IMPREGNATING SYSTEMS and CASTING SEALER

Tousey Varnish Co., 520 West 25th St., Chicago 16, Ill.

INGOT MOLDS

Acme Foundry Co., Detroit 16, Mich.

Great Lakes Carbon Corp., 579 Fifth Ave., New York 36, N. Y.

National Carbon Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

INGOTS—(See type of metal)

INOCULANTS

Carborundum Co., Perth Amboy, N. J.

United States Graphite Co., Saginaw, Mich.

INSPECTION EQUIPMENT

Allis-Chalmers, Milwaukee 1, Wis.

Dietert, Harry W., 9330 Roselawn Ave., Detroit 4, Mich.

Detroit Testing Machine Co., 9390 Grinnell Ave., Detroit 13, Mich.

Eastman Kodak Co., Rochester, N. Y.

King Tester Corp., 440 North 13th St., Philadelphia, Pa.

Magnaflux Corp., 7300 West Lawrence Ave., Chicago 31, Ill.

Steel City Testing Machines Inc., 8817 Lyndon, Detroit 21, Mich.

U. S. Electric Mfg. Corp., 222 West 14th St., New York 11, N. Y.

IRON CEMENT

Smooth-On Mfg. Co., 570 Communipaw Ave., Jersey City 4, N. J.

IRON ORE

Pickands, Mather & Co., Union Commerce Bldg., Cleveland 14, O.

IRON OXIDES

Carpenter Brothers, Inc., 606 West Wisconsin Ave., Milwaukee 3, Wis.

Delta Oil Products Co., Milwaukee 9, Wis.

Tamms Industries Inc., 228 No. La Salle St., Chicago 1, Ill.

Thiem Products Co., 9800 West Rogers, Milwaukee 14, Wis.

JACKETS (Mold)—See MOLD JACKETS

LABORATORY EQUIPMENT (Chemical)

Harry W. Dietert Co., 9330 Roselawn Ave., Detroit 4, Mich.

Great Western Mfg. Co., Leavenworth, Kansas.

LABORATORY EQUIPMENT (Physical)

Harry W. Dietert Co., 9330 Roselawn Ave., Detroit 4, Mich.

Claud S. Gordon Co., 3000 So. Wallace, Chicago 16, Ill.

Great Western Mfg. Co., Leavenworth, Kansas.

National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

Norton Co., Worcester 6, Mass.

LADLES

Industrial Equipment Co., Minster, O.

Modern Equipment Co., Port Washington, Wis.

Spincraft Inc., 4122 W. State St., Milwaukee 8, Wis.

Frederic B. Stevens, Inc., Detroit 16, Mich.

Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

LADLE LININGS—See REFRACTORIES

LEAD

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5.

Henning Bros. & Smith Inc., 91 Scott Ave., Brooklyn, N. Y.

George Sall Metals Co., 2300 East Butler St., Philadelphia 37, Pa.

LIFT TRUCKS (See Trucks, Power Lift)

LINERS (Shot Blast Equipment)

Gates Rubber Co., 999 South Broadway, Denver 17, Colo.

LINSEED OIL

Archer-Daniels-Midland Co., Foundry Products Division, 2191 W. 110th St., Cleveland 2, Ohio.

Hercules Powder Co., Wilmington 99, Del.

United Oil Co., Erie, Pa.

LITHIUM

Lithium Corp. of America, Rand Tower, Minneapolis, Minn.

LOADERS

Barber-Greene Co., Aurora, Ill.

Clearfield Machine Co., Clearfield, Pa.

Modern Equipment Co., Port Washington, Wis.

National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

LOADERS (Front-End)

Baker-Raulang Co., 1250 West 80th St., Cleveland 2, Ohio.

Clark Industrial Truck Div. Clark Equipment Co., Battle Creek, Mich.

Frank G. Hough Co., 703 Sunnyside Ave., Libertyville, Ill.

Hyster Co., 2902 N.E. Clackamas St., Portland 8, Oregon.

Tractomotive Corp., Deerfield, Ill.

LUBRICANTS (Industrial)

Acheson Colloids Co., Port Huron, Mich.

Penola Oil Co., 14300 McNichols Rd., West, Detroit 35, Mich.

Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.

United Oil Mfg. Co., Erie, Pa.

United States Graphite Co., Saginaw, Mich.

MACHINE KEYS

Standard Horse Nail Corp., New Brighton, Pa.

MAGNESIUM INGOTS

Christiansen Corp., 210 South Marion, Oak Park 1, Ill.

Federated Metals Division of American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.

MAGNET CONTROLLERS

Electric Controller & Mfg. Co., 4500 Lee Rd., Cleveland 28, Ohio.

Ohio Electric Mfg. Co., 5400 Dunham Rd., Maple Heights, Ohio.

MAGNETIC PARTICLE TESTING

Magnaflux Corp., 7300 West Lawrence Ave., Chicago 31, Ill.

MAGNETS

Dings Magnetic Separator Co., 4740 Electric Ave., Milwaukee 7, Wis.

Electric Controller & Mfg. Co., 4500 Lee Rd., Cleveland 28, Ohio.

Ohio Electric Mfg. Co., 5400 Dunham Rd., Maple Heights, Ohio.

Stearns Magnetic Mfg. Co., 635 S. 28th St., Milwaukee 46, Wis.

MANGANESE (Briquets)

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 420 Lexington Ave., New York 17, N. Y.

Whitehead Metal Products, 303 West 10th St., New York 6, N. Y.

MATCHPLATE METAL

Federated Metals Division of American Smelting and Refining Co., 120 Broadway, New York 5, N.Y.

MATCHPLATES

Accurate Match Plate Co., 1847 W. Carroll St., Chicago, Ill.

Champion Div. Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.

City Pattern Foundry & Machine Co., 1165 Harper, Detroit 11, Mich.

Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.

Scientific Cast Products Corp., 1388-92 E. 40th St., Cleveland 3, O.

MELTING POTS

Acme Foundry Co., Detroit 16, Mich.

METAL CLEANING—See BLAST CLEANING EQUIPMENT

METERS (Gas, Air, Water)

Illinois Testing Laboratories, Inc., 418 N. LaSalle St., Chicago 10, Ill.

MIXERS (Core Wash)

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

MOLD CONVEYORS — See CONVEYORS (Mold)

MOLD DRYERS

Hauck Mfg. Co., 106 Tenth St., Brooklyn 15, N. Y.

Kirk & Blum Mfg. Co., 3108 Forrer St., Cincinnati 9, Ohio.

Liquid Carbonic Corp., 3110 S. Kedzie Ave., Chicago 23, Ill.

MOLD JACKETS

Adams Co., Dubuque, Iowa.

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

Fremont Flask Co., Fremont, O.

Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.

Products Engineering Co., Cape Girardeau, Missouri.

MOLD OVENS—See CORE and MOLD OVENS

MOLD SEAL COMPOUND

Presstite Keystone Engineering Products Co., 39th & Chouteau, St. Louis, Mo.

Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

MOLD WASH—See CORE and MOLD WASH

MOLDING MACHINES

Adams Co., Dubuque, Iowa.

Beardsley & Piper Div. Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.

Champion Div. Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.

Davenport Machine & Foundry Co., Davenport, Iowa.

Eastern Clay Products Dept. International Minerals & Chemicals Corp., 20 North Wacker Drive, Chicago 6, Ill.

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.

International Molding Machine Co., LaGrange Park, Ill.

Johnston & Jennings Div., Pettibone-Mulliken Corp., 2424 No. Cicero Ave., Chicago 39, Ill.

Milwaukee Foundry Equipment Div., Spo Inc., 3328 W. Pierce St., Milwaukee 4, Wis.

Nicholls, Wm. H., Co., Richmond Hill, Long Island 18, N. Y.

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.

S. P. O. Incorporated, 7500 Grand Division Ave., Cleveland 5, O.

Shalco Engineering Corp., Palo Alto, Calif.

Sutter Products Co., Dearborn, Mich.

Tabor Mfg. Co., Div. Turbo Machine Co., Lansdale, Pa.

MOLDING SANDS—See SAND

MOLYBDENUM and COMPOUNDS

Climax Molybdenum Co., 500 Fifth Ave., New York 36, N. Y.

MONORAIL SYSTEMS—See CONVEYORS (Overhead Monorail)

MOTORS (Electric)

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

Link-Belt Co., Prudential Plaza, Chicago, Ill.

Ohio Electric Mfg. Co., 5400 Dunham Rd., Maple Heights, Ohio.

MULLERS—See SAND PREPARATION EQUIPMENT

NAILS (Chill)

Crescent Brass & Pin Co., 5766 Trumbull Ave., Detroit, Mich.

Republic Steel Corp., 3100 E. 45th St., Cleveland 27, Ohio.

Standard Horse Nail Corp., New Brighton, Pa.

NICKEL

International Nickel Co., Inc., 67 Wall St., New York City 5.

Whitehead Metal Products, 303 West 10th St., New York 6, N. Y.

NITROGEN—See GAS

NOZZLES (Blasting)

Alloy Metal Abrasives Co., 121 South Division St., Ann Arbor, Mich.

Carborundum Co., Perth Amboy, N. J.

Carpenter Brothers, Inc., 606 W. Wisconsin Ave., Milwaukee 3, Wis.

Davenport Machine & Foundry Co., Davenport, Iowa.

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

Norton Co., Worcester 6, Mass.

Pangborn Corp., Hagerstown, Md.

W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.

Wheelabrator Corp., 505 S. Byrkit St., Mishawaka, Ind.

OIL BURNERS—See BURNERS

OPEN HEARTH DOORS

Wm. M. Bailey Co., Pittsburgh 16, Pa.

OPTICAL PYROMETERS—See PYROMETERS

OVENS (Annealing and Heat Treating)—See FURNACES (Heat Treating and Annealing)

OVENS (Core)—See CORE and MOLD OVENS

OVENS (Enameling, Japanning)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.

Despatch Oven Co., Minneapolis 14, Minn.

Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

Kirk & Blum Mfg. Co., 3108 Forrer St., Cincinnati 9, Ohio.

Lanly Co., 750 Prospect Ave., Cleveland 15, Ohio.

Michigan Oven Co., 419 Brainard, Detroit 1, Mich.

W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.

OVENS (Mold Drying)—See CORE and MOLD OVENS

OXYGEN—See GAS

PARTING COMPOUNDS

Acheson Colloids Co., Port Huron, Mich.

Archer-Daniels-Midland Co., Foundry Products Division, 2191 W. 110th St., Cleveland 2, Ohio.

Delta Oil Products Co., Milwaukee 9, Wis.

Dow Corning Corp., Midland, Mich.

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

Foundry Services, Inc., 2000 Bruck St., Columbus 7, Ohio.

E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.

Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.

Frederic B. Stevens, Inc., Detroit 16, Mich.

Tamms Industries Inc., 228 N. LaSalle St., Chicago 1, Ill.

Thiem Products Co., 9800 West Rogers, Milwaukee 14, Wis.

United Oil Co., Erie, Pa.

Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

PATTERN COATINGS

Acheson Colloids Co., Port Huron, Mich.

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.

Foundry Rubber Inc., 6100 River Rd., Washington 16, D. C.

PATTERN COMPOUND

Tamms Industries Inc., 228 N. LaSalle St., Chicago 1, Ill.

PATTERN DRAW MACHINES

The Adams Co., Dubuque, Iowa.

Beardsley & Piper Div. Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.

Champion Div. Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.

Davenport Machine & Foundry Co., Davenport, Iowa.

International Molding Machine Co., LaGrange Park, Ill.

Milwaukee Foundry Equipment Div., Spo Inc., 3238 W. Pierce St., Milwaukee 4, Wis.

Tabor Mfg. Co., Div. Turbo Machine Co., Lansdale, Pa.

PATTERN METAL

Cerro de Pasco Copper Co., 300 Park Ave., New York 22, N. Y.

Federated Metals Division of American Smelting and Refining Co., 120 Broadway, New York 5, N.Y.

PATTERN PLATES—See PATTERNS and PATTERN PLATES (Wood, Metal)

PATTERN SHOP EQUIPMENT

DoAll Co., Des Plaines, Ill.

Oliver Machinery Company, Grand Rapids 2, Mich.

Tamms Industries Inc., 228 N. LaSalle St., Chicago 1, Ill.

PATTERNS and PATTERN PLATES (Wood, Metal, Plastic)

Accurate Match Plate Co., 1847 W. Carroll St., Chicago, Ill.

Anderson Pattern Inc., Muskegon Heights, Mich.

Automotive Pattern Co., 1884 John R. Street, Detroit 3, Mich.

Champion Div. Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.

City Pattern Foundry & Machine Co., 1165 Harper, Detroit 11, Mich.

Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.

Pyle Pattern & Mfg. Co., 2636 Sanford St., Muskegon Heights, Mich.

S.P.O. Incorporated, 7500 Grand Division Ave., Cleveland 5, O.

Scientific Cast Products Corp., 1388-92 E. 40th St., Cleveland 3, O.

PERMANENT MOLDS

Centrifugal Casting Machine Co., Tulsa, Okla.

Great Lakes Carbon Corp., 579 Fifth Ave., New York 36, N. Y.

National Carbon Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

PHOSPHOR COPPER

Federated Metals Division of American Smelting and Refining Co., 120 Broadway, New York 5, N.Y.

PHOTOGRAPHIC EQUIPMENT

Eastman Kodak Co., Rochester, N. Y.

PIG CASTING MACHINES

Wm. M. Bailey Co., Pittsburgh 16, Pa.

PIG IRON

Hanna Furnace Co., Ecorse, Detroit 29, Mich.

Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, O.

Keokuk Electro Metals Co., 429 So. 4th St., Keokuk, Iowa.

Miller & Company, 332 S. Michigan Ave., Chicago 4, Ill.

Pickands, Mather & Co., Union Commerce Bldg., Cleveland 14, Ohio.

Pittsburgh Coke & Chemical Co., Grant Building, Pittsburgh 19, Pa.

Republic Steel Corp., 3100 E. 45th St., Cleveland 27, Ohio.

Woodward Iron Co., Woodward, Ala.

PIG IRON (Silvery)

Hanna Furnace Co., Ecorse, Detroit 29, Mich.

Pickands, Mather & Co., Union Commerce Bldg., Cleveland 14, Ohio.

Keokuk Electro Metals Co., 429 So. 4th St., Keokuk, Iowa.

Miller & Company, 332 S. Michigan Ave., Chicago 4, Ill.

PINS (Flask)—See FLASK BUSHINGS, PINS and FITTINGS

PITCH

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.

Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

PLUMBAGO—See GRAPHITE and GRAPHITE BRIQUETS

PNEUMATIC TOOLS and CHISELS

Aro Equipment Corp., Bryan, Ohio.

Chicago Pneumatic Tool Co., 6 East 44th St., New York 17, N. Y.

Cleco Pneumatic Tool Div., Reed Roller Bit Co., Houston, Texas.

Dayton Pneumatic Tool Co., Dayton 1, Ohio.

Gardner-Denver Co., Quincy, Ill.

Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.

Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.

Master Pneumatic Tool Co., Inc., Orwell, Ohio.

Schramm Inc., West Chester, Pa.

Thor Power Tool Co., Aurora, Ill.

POURING DEVICES

Cleveland Tramrail Div., Cleveland Crane & Engineering Co., Wickliffe, Ohio.

Industrial Equipment Co., Minster, Ohio.

Modern Equipment Co., Port Washington, Wis.

Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

PRESSER BOARDS

Adams Co., Dubuque, Iowa.

Christiansen Corp., 210 South Marion, Oak Park 1, Ill.

PRESSURE RECORDERS

Foxboro Company, Foxboro, Mass.

PULLEYS (Magnetic)—See SEPARATORS (Magnetic)

PUMPS

Gardner-Denver Co., Quincy, Ill.

PUMPS (Dry, Vacuum)

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

Fuller Company, Catasauqua, Pa.

Kinney Mfg. Div. New York Air Brake Co., 3541 Washington St., Boston 30, Mass.

PUSH-OFF MACHINES—See PATTERN DRAW MACHINES

PUTTY (Foundry)

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

PYROMETERS

Foxboro Company, Foxboro, Mass.

Claud S. Gordon Co., 3000 So. Wallace, Chicago 16, Ill.

Illinois Testing Laboratories, Inc., 418 N. LaSalle St., Chicago 10, Ill.

Marshall Co., L. H., 270 W. Lane, Columbus 14, O.

Pyrometer Instrument Co., Bergenfield, N. J.

Tamms Industries Inc., 228 N. LaSalle St., Chicago 1, Ill.

RACKS (Core Ovens)

Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

Kirk & Blum Mfg. Co., 3108 Forrer St., Cincinnati 9, Ohio.

RADIOGRAPHY (Industrial)

Eastman Kodak Co., Rochester, N. Y.

Metal & Thermit Corp., Rahway, New Jersey.

REFRACTORIES (Firebrick, Fire Clay, Fire Sand, Fire Stone)

Ajax Electrothermic Corp., Trenton, N. J.

Babcock & Wilcox Co., 161 42nd St., New York 17, N. Y.

Campbell-Hausfeld Co., Harrison, O.

Carborundum Co., Niagara Falls, N. Y.

Carborundum Co., Perth Amboy, N. J.

Carpenter Brothers Inc., 606 West Wisconsin Ave., Milwaukee 3, Wis.

Cedar Heights Clay Co., Oak Hill, Ohio.

The Cleveland Quarries Co., Amherst, Ohio.

Delhi Foundry Sand Co., Sayler Park Station, Cincinnati 33, Ohio.

Durex Refractories Co., P.O. Box 147, Jackson, Ohio.

Eastern Clay Products Dept., International Minerals & Chemical Corp., 20 N. Wacker Dr., Chicago 6, Ill.

General Refractories Co., 1520 Locust St., Philadelphia 2, Pa.

Great Lakes Carbon Corp., 579 Fifth Ave., New York 36, N. Y.

A. P. Green Fire Brick Co., Mexico, Missouri.

Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.

Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, Ohio.

Illinois Clay Products Co., Joliet, Ill.

Ironton Fire Brick Co., Ironton, O.

Johns-Manville, 22 East 40th St., New York 16, N. Y.

Laclede Christy Div., H. K. Porter Co. Inc., 2000 Hampton Ave., St. Louis 10, Mo.

Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.

Mexico Refractories Co., Mexico, Mo.

Mullite Refractories, Shelton, Conn.

National Carbon Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

North American Refractories Co., National City Bank Bldg., Cleveland 14, Ohio.

Norton Co., Worcester 6, Mass.

Frederic B. Stevens, Inc., 18th St. & Vernor Highway, Detroit 16, Mich.

Stroman Furnace & Engineering Co., Div. of Petersen Oven Co., 9900 Franklin Ave., Franklin Park, Ill.

Chas. Taylor Sons Co., 710 Burns St., Cincinnati 4, Ohio.

Titanium Alloy Mfg. Div., National Lead Co., 111 Broadway, New York 6, N. Y.

United States Graphite Co., Saginaw, Mich.

Walsh Refractories, 101 Ferry St., St. Louis 7, Mo.

Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

REFRACTORY GUNS

Burgess-Sterbentz Corp., 3790 West 150th St., Cleveland 11, Ohio.

Durex Refractories Co., P.O. Box 147, Jackson, Ohio.

Eastern Clay Products Dept., International Minerals & Chemicals Corp., 20 N. Wacker Drive, Chicago 6, Ill.

Peterson Foundry Supply Co., 39th Place & Racine, Chicago, Ill.

RESIN (Shell Mold)

Acme Resin Corp., Forest Park, Ill.

Archer-Daniels-Midland Co., Foundry Products Division, 2191 W. 110th St., Cleveland 2, Ohio.

The Borden Co., Thor Division, 350 Madison Ave., New York 17, N. Y.

Catalin Corp. of America, 1 Park Ave., New York 16, N. Y.

Durez Plastics Div. Hooker Electrochemical Co., 1011 Walck Rd., North Tonawanda, N. Y.

General Electric Co., Chemical Materials Dept., 1 Plastics Ave., Pittsfield, Mass.

B. F. Goodrich Chemical Co., Rose Bldg., Cleveland 15, Ohio.

Hercules Powder Co., Wilmington 99, Del.

Monsanto Chemical Co., Plastics Div., Springfield 2, Mass.

Plastics Engineering Co., 1607 Geele, Sheboyan, Wis.

Reichhold Chemical Co., 525 North Broadway, White Plains, N. Y.

Schenectady Resins, P. O. Box 1046, Schenectady, New York.

RESPIRATORS

American Optical Co., Southbridge, Mass.

Chicago Eye Shield Co., 2300 West Warren, Chicago 12, Ill.

RIDDLES (Electric)

Champion Div. Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

Foundry Supplies & Mfg. Co., 2221 Orchard St., Chicago 14, Ill.

Great Western Mfg. Co., Leavenworth, Kans.

RIDDLES (Hand)

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

Great Western Mfg. Co., Leavenworth, Kansas.

Frederic B. Stevens Inc., 18th St. & Vernor Highway, Detroit 16, Mich.

RISER COMPOUNDS

Foundry Services, Inc., 2000 Bruck St., Columbus, Ohio.

Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.

U. S. Graphite Co., Saginaw, Mich.

ROD STRAIGHTENERS—See CORE ROD STRAIGHTENING and CUTTING MACHINERY

ROLLER-HEARTH FURNACES — See FURNACES (Heat Treating and Annealing)

RUBBER LINING MATERIAL (Abrasive Resisting)

B. F. Goodrich Co., Akron 18, Ohio.

Pangborn Corp., Hagerstown, Md.

SAFETY EQUIPMENT

American Optical Co. Southbridge, Mass

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.

Chicago Eye Shield Co., 2300 West Warren, Chicago 12, Ill.

Industrial Gloves Co., Danville, Ill.

Pangborn Corp., Hagerstown, Md.

United States Rubber Co., 4300 New Haven Ave., Ft. Wayne 4, Ind.

SAND (Core, Molding, Blasting)

Carpenter Brothers, Inc., 606 West Wisconsin, Milwaukee 3, Wis.

Delhi Foundry Sand Co., Sayler Park Station, Cincinnati 33, Ohio.

Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, Ohio.

Orefraction Inc., 7425 Thomas St., Pittsburgh 8, Pa.

Ottawa Silica Co., Ottawa, Ill.

Pangborn Corp., Hagerstown, Md.

Pennsylvania Glass Sand Corp., 140 Stanwix St., Pittsburgh 22, Pa.

Standard Silica Co., Ottawa, Ill.

Titanium Alloy Mfg. Div., National Lead Co., 111 Broadway, New York 6, N. Y.

Wedron Silica Co., 135 S. LaSalle St., Chicago 3, Ill.

Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

SAND BLAST BARRELS—See BLAST CLEANING EQUIPMENT

SAND BLAST EQUIPMENT—See BLAST CLEANING EQUIPMENT

SAND BLAST NOZZLES—See NOZZLES (Blasting)

SAND BLAST ROOMS—See BLAST CLEANING EQUIPMENT

SAND BLAST TABLES—See BLAST CLEANING EQUIPMENT

SAND CONTROL and TESTING EQUIPMENT

Beardsley & Piper Div. Pettibone Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill.

Carpenter Brothers, Inc., 606 West Wisconsin Ave., Milwaukee 3, Wis.

Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.

Claud S. Gordon Co., 3000 So. Wallace, Chicago 16, Ill.

Great Western Mfg. Co., Leavenworth, Kans.

Hartley Controls Corp., Neenah, Wis.

National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

SAND DRYERS

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, Ohio.

Link-Belt Co., Prudential Plaza, Chicago 1, Ill.

Nichols Engineering & Research Corp., 70 Pine St., New York 5, N. Y.

SANDING MACHINERY (Disc, Spindle, Belt, etc.)

Cleco Division of Reed Roller Bit Co., Houston, Texas.

Oliver Machinery Company, Grand Rapids 2, Mich.

SAND MEASURING and WEIGHING DEVICES

Baker Perkins Inc., Saginaw, Mich.

Link-Belt Co., Prudential Plaza, Chicago 1, Ill.

National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

SAND MIXERS—See SAND PREPARATION EQUIPMENT

SAND PREPARATION EQUIPMENT

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

American Air Filter Co., Louisville 8, Ky.

Baker Perkins Inc., Saginaw, Mich.

Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.

Beardsley & Piper Div. Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.

Blystone Division, Standard Sand & Machine Co., 549 W. Washington Blvd., Chicago 6, Ill.

Carrier Conveyor Corp., Frankfort Ave. at Clifton, Louisville 6, Ky.

Champion Div., Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.

Clearfield Machine Co., Clearfield, Pa.

Cleveland Tramrail Div., Cleveland Crane & Engineering Co., Wickliffe, Ohio.

Deister Concentrator Co., 901 Glasgow Ave., Ft. Wayne, Ind.

Harry W. Dietert Co., 9330 Roselawn Ave., Detroit 4, Mich.

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, Ohio.

Foundry Supplies & Mfg. Co., 2221 Orchard St., Chicago 14, Ill.

B. F. Goodrich Co., Akron 18, Ohio.

Great Western Mfg. Co., Leavenworth, Kansas.

Hydro-Blast Corp., 10265 Franklin Ave., Franklin Park, Ill.

Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.

Link-Belt Company, Prudential Plaza, Chicago 1, Ill.

Monsanto Chemical Co., Plastics Division, Springfield 2, Mass.

Moulders Friend, Dallas City, Ill.

National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

Newaygo Engineering Co., Newaygo, Mich.

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.

Pekay Machine & Engineering Co., 865 N. Sangamon St., Chicago 22, Ill.

Planet Corp., 1820 Sunset, Lansing 6, Mich.

Royer Foundry & Machine Co., Kingston, Pa.

Simplicity Engineering Co., Durand, Mich.

States Engineering Corp., 922 W. Berry, Ft. Wayne 2, Ind.

Wheelabrator Corp., Mishawaka, Ind.

SAND RAMMERS

Chicago Pneumatic Tool Co., 6 East 44th St., New York 17, N. Y.

Cleco Pneumatic Tool Div., Reed Roller Bit Co., Houston, Texas.

Dayton Pneumatic Tool Co., Dayton 1, O.

Master Pneumatic Tool Co., Inc., Orwell, Ohio.

SAND RECLAIMERS

Deister Concentrator Co., 901 Glasgow Ave., Ft. Wayne, Ind.

Hydro-Blast Corp., 10265 Franklin Ave., Franklin Park, Ill.

Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.

Link-Belt Co., Prudential Plaza, Chicago 1, Ill.

National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

Nichols Engineering & Research Corp., 70 Pine St., New York 5, N. Y.

Stearns Magnetic Mfg. Co., 635 S. 28th St., Milwaukee 46, Wis.

SAND SIFTING and SCREENING MACHINERY—See SAND PREPARATION EQUIPMENT

SAND STABILIZER

Archer-Daniels-Midland Co., Foundry Products Division, 2191 W. 110th St., Cleveland 2, Ohio.

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, Ohio

Foundry Services, Inc., 2000 Bruck St., Columbus 7, Ohio.

SAND STORAGE BINS and GATES

American Bridge Div. United States Steel Corp., 525 Wm. Penn Place, Pittsburgh 19, Pa.

Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, Ohio.

Beardsley & Piper Div., Pettibone Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill.

Link-Belt Co., Prudential Plaza, Chicago 1, Ill.

Marietta Concrete Corp., Marietta, Ohio.

National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

Neff & Fry Co., Camden, Ohio.

Newaygo Engineering Co., Newaygo, Mich.

Planet Corp., 1820 Sunset, Lansing 6, Mich.

SAW SHARPENING SERVICE

Hinckley Industries, Inc., Post Office Box 1100, Brunswick, Ohio.

SAWS (Band, Metal, Wood)

American Saw & Mfg. Co., Springfield, Mass.

Chicago Pneumatic Tool Co., 6 E. 44th St., New York 17, N. Y.

DoAll Co., Des Plaines, Ill.

Hinckley Industries, Inc., Post Office Box 1100, Brunswick, Ohio.

Oliver Machinery Company, Grand Rapids 2, Mich.

SCALING HAMMERS—See PNEUMATIC TOOLS and CHISELS

SCALES

Martin-Decker Corp., 3431 Cherry Ave., Long Beach, Calif.

Toledo Scale Co., Toledo 1, Ohio.

SCREENS (Shakeout and Vibrating)

Ajax Flexible Coupling Co., Westfield, N. Y.

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, Ohio.

Beardsley & Piper Div. Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.

Carrier Conveyor Corp., Frankfort Ave. at Clifton, Louisville 6, Ky.

Diester Concentrator Co., 901 Glasgow Ave., Ft. Wayne, Ind.

Great Western Mfg. Co., Leavenworth, Kansas.

Link-Belt Co., Prudential Plaza, Chicago 1, Ill.

National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Robins Conveyors Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.
Simplicity Engineering Co., Durand, Mich.

SEA COAL

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Frederic B. Stevens, Inc., Detroit 16, Mich.
Thiem Products Co., 9800 West Rogers, Milwaukee 14, Wis.
Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

SEPARATORS (Air, Moisture, Oil)

American Air Filter Co., Louisville 8, Ky.
Jas. A. Murphy & Co., Hamilton, O.
C. A. Norgren Co., 3400 South Elati, Englewood, Calif.
Pangborn Corp., Hagerstown, Md.
A. Schrader's Son, 470 Vanderbilt Ave., Brooklyn 17, N. Y.
Wheelabrator Corp., Mishawaka, Ind.

SEPARATORS (Magnetic)

Beardsley & Piper Div., Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Dings Magnetic Separator Co., 4740 Electric Ave., Milwaukee 7, Wis.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, Ohio.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Stearns Magnetic Mfg. Co., 635 S. 28th St., Milwaukee 46, Wis.

SHAKE-OUT MACHINERY

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
American Air Filter Co., Louisville 8, Ky.
Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, O.
Beardsley & Piper Div., Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
The Branford Co., 130 Chestnut St., New Haven 7, Conn.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, Ohio.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.
Planet Corp., 1820 Sunset, Lansing 6, Mich.
Robins Conveyors, Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.
Royer Foundry & Machine Co., Kingston, Pa.
Simplicity Engineering Co., Durand, Mich.

SHELL MOLDING (Equipment and Accessories)

Beardsley & Piper Div., Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Carver Foundry Products, Muscatine, Iowa.
C & S Products Co., 12733 Fullerton Ave., Detroit 27, Mich.
Centrifugal Casting Machine Co., Tulsa, Okla.
Hutchinson Shell Mold Co., Post Office Box 188, Alton, Ill.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
SPO Inc., 7500 Grand Division Ave., Cleveland 5, Ohio.
Shalco Engineering Corp., Palo Alto, Calif.
Shell Process Inc., McKinstry Ave., Chicopee, Mass.
Sutter Products Co., Dearborn, Mich.

SHELL MOLD SAND (Coated)

Acme Resin Corp., Forest Park, Ill.

SHELL MOLDS—See RESIN

SHOT AND GRIT

Abrasive Shot and Grit Company, Springville, New York.
Alloy Metal Abrasive Co., 121 South Division St., Ann Arbor, Mich.
Carborundum Co., Niagara Falls, N. Y.
Carpenter Brothers, Inc., 606 West Wisconsin, Milwaukee 3, Wis.
Cleveland Metal Abrasive Co., 887 E. 67th St., Cleveland, Ohio.
Delhi Foundry Sand Co., Sayler Park Station, Cincinnati 33, Ohio.
Globe Steel Abrasive Co., Mansfield, Ohio.
Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, O.
Metal Blast, Inc., 871 E. 67th St., Cleveland, Ohio.
National Metal Abrasive Co., 3560 Norton Ave., Cleveland 7, O.
Norton Co., Worcester 6, Mass.
Pangborn Corp., Hagerstown, Md.
Pittsburgh Crushed Steel Co., Pittsburgh 1, Pa.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.
Steel Shot Producers, Inc., Butler, Pa.
Wheelabrator Corp., Mishawaka, Ind.

SHOT (Peening)—See SHOT and GRIT

SHOVELS

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Frederic B. Stevens, Inc., Detroit 16, Mich.

SHOVELS (Power)

Allen Industrial Products, Inc., P.O. Box 75, Battle Creek, Mich.
Clark Industrial Truck Div., Clark Equipment Co., Battle Creek, Mich.
Frank G. Hough Co., 703 Sunnyside Ave., Libertyville, Ill.

SILICA FLOUR

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Carpenter Brothers, Inc., 606 West Wisconsin Ave., Milwaukee 3, Wis.
Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, O.
Ottawa Silica Co., Ottawa, Ill.
Pennsylvania Pulverizing Co., 140 Stanwix St., Pittsburgh 22, Pa.
Standard Silica Co., Ottawa, Ill.
Wedron Silica Co., 135 S. LaSalle St., Chicago 3, Ill.

SILICOMANGANESE

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 120 Lexington Ave., New York 17, N. Y.
Pickands-Mather & Co., Union Commerce Bldg., Cleveland 14, Ohio.
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

SILICON (Briquets)

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 420 Lexington Ave., New York 17, N. Y.
Ohio Ferro Alloys Corp., Canton 9, Ohio.
Whitehead Metal Products, 303 West 10th St., New York 14, N. Y.

SILICON CARBIDE (Briquets)

Carborundum Co., Perth Amboy, N. J.
Ohio Ferro Alloys Corp., Canton 9, Ohio.

SILVERY PIG IRON—See PIG IRON (Silvery)

SKIMMERS

Tamms Industries Inc., 228 North LaSalle St., Chicago 1, Ill.

SLINGS (Chain)—See CHAIN

SLIP FLASKS—See FLASKS, (Slip)

SLIP JACKETS—See MOLD JACKETS

SMELTERS and REFINERS

Christiansen Corp., 210 South Marion, Oak Park 1, Ill.
Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5.
Western Metal Co., 3201 So. Kedzie Ave., Chicago 23, Ill.

SNAGGING MACHINES—See GRINDERS

SNAGGING WHEELS—See GRINDING WHEELS

SNAP FLASKS—See FLASKS (Snap)

SODA ASH

Columbia-Southern Chemical Corp., Div., Pittsburgh Plate Glass Co., Pittsburgh 19, Pa.
Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, Ohio.
Hercules Powder Co., Wilmington 99, Del.
Olin Mathieson Chemical Corp., Mathieson Bldg., Baltimore 3, Md.
Solvay Process Division, Allied Chemical & Dye Corp., 61 Broadway, New York 6, N. Y.

SOLDER

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5.

SPECTROGRAPHIC ANALYSIS

Spectrochemical Laboratories, Inc., P.O. Box 8781, Pittsburgh 20, Pa.

SPRAY GUNS

The Branford Co., 130 Chestnut St., New Haven 7, Conn.
Foundry Services, Inc., 2000 Bruck St., Columbus 7, Ohio.
Murphy & Co., Jas. A., Hamilton, O.

SPRUE CUTTERS

Adams Co., Dubuque, Iowa.
Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, Ohio.
Milwaukee Chaplet & Mfg. Co., 1023 S. 40th St., Milwaukee, Wis.
Rice Pump & Machine Co., Belgium, Wis.

STEEL SHOT—See SHOT and GRIT

STEEL (Structural)

American Bridge Co., Div., United States Steel Corp., 52 S. Wm. Penn Place, Pittsburgh 19, Pa.

STRAINER CORES—See CORES (Strainer, Ceramic)

STRIPPING MACHINES—See PATTERN DRAW MACHINES

TANK TRAPS

Jas. A. Murphy & Co., Hamilton, Ohio.

TANKS (Dewatering)

Claude B. Schneible Co., 212 Stephenson Bldg., P. O. Box 81, North End Station, Detroit 2, Mich.

TELLURIUM

American Smelting & Refining Co., 120 Broadway, New York 5, N. Y.

TEMPERATURE CONTROLLERS

Foxboro Company, Foxboro, Mass.
Illinois Testing Laboratories, Inc., 418 N. LaSalle St., Chicago 10, Ill.
Marshall Co., L. H., 270 W. Lane, Columbus 14, O.

TENSILE TESTING MACHINES

Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.
Detroit Testing Machine Co., 19390 Grinnell Ave., Detroit 13, Mich.
Steel City Testing Machines, Inc., 8817 Lyndon, Detroit 21, Mich.

TESTING EQUIPMENT—See Type of Test

THERMOCOUPLES

Claud S. Gordon Co., 3000 So. Wallace, Chicago 16, Ill.
Illinois Testing Laboratories, Inc., 418 N. LaSalle St., Chicago 10, Ill.
Marshall Co., L. H., 270 W. Lane, Columbus 14, O.
Pyrometer Instrument Co., Bergenfield, N. J.
Tamms Industries Inc., 228 N. LaSalle St., Chicago 1, Ill.

TIMERS (Electric)

Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.

TIN

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.
Henning Bros. & Smith Inc., 91 Scott Ave., Brooklyn, N. Y.

TIRES (Industrial)

Mitchell Industrial Tire Co., 1400 East 40th St., Chattanooga 7, Tenn.

TONGS

Industrial Equipment Co., Minster, O.

TORCHES and BURNERS (Acetylene, Gas, Oil)

Hauck Mfg. Co., 106 Tenth St., Brooklyn 15, N. Y.

Linde Air Products Co., Div. Union Carbide & Carbon Corp., 420 Lexington Ave., New York 17, N. Y.

Liquid Carbonic Corp., 3110 S. Kedzie Ave., Chicago 23, Ill.

TORCHES (Gouging and Cutting)—See WELDING, CUTTING and GOUGING APPARATUS

TOTE BOXES—See BOXES (Stacking, Tote)

TRACTOR—See TRUCKS (Utility and Power Lift)

TRAMRAIL SYSTEMS—See CONVEYORS (Overhead Monorail)

TROLLEYS

Curtis Pneumatic Machinery Div. Curtis Mfg. Co., 1905 Kienlen Ave., St. Louis 20, Mo.

Link-Belt Company, Prudential Plaza, Chicago 1, Ill.

Modern Equipment Co., Port Washington, Wis.

TRUCK CRANES

Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland 3, Ohio.

Silent Hoist & Crane Co., 885 63rd St., Brooklyn 20, N. Y.

TRUCKS (Core)

Buda Div., Allis Chalmers Mfg. Co., 1123 South 70th St., Milwaukee 14, Wis.

Clark Industrial Truck Div., Clark Equipment Co., Battle Creek, Mich.

Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

Kirk & Blum Mfg. Co., 3108 Forrer St., Cincinnati 9, Ohio.

Prime Mover Co., Muscatine, Iowa.

Ready Power Co., 3826 Grand River Ave., Detroit 8, Mich.

Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

TRUCKS (Utility and Power Lift)

Baker-Raulang Co., 1250 West 80th St., Cleveland 2, Ohio.

Buda Div., Allis Chalmers Mfg. Co., 1123 South 70th St., Milwaukee 14, Wis.

Clark Industrial Truck Div., Clark Equipment Co., Battle Creek, Mich.

Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland 3, Ohio.

Frank G. Hough Co., 703 Sunnyside Ave., Libertyville, Ill.

Hyster Co., 2902 N.E. Clackamas St., Portland 8, Oregon.

Kwik-Mix Co., 3026 West Concordia, Milwaukee 16, Wis.

Ready Power Co., 3826 Grand River Ave., Detroit 8, Mich.

Silent Hoist & Crane Co., 885 63rd St., Brooklyn 20, N. Y.

Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

Tractomotive Corp., Deerfield, Ill.

TUMBLING BARRELS

W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.

Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

TUMBLING BARRELS (cleaning compounds)

Almco Div. Queen Stove Works, Albert Lea, Minn.

TURNTABLES

Beardsley & Piper Div. Pettibone Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill.

Modern Equipment Co., Port Washington, Wis.

Newaygo Engineering Co., Newaygo, Mich.

Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

UNLOADERS (Car)

Barber-Greene Co., Aurora, Ill.

Link-Belt Company, Prudential Plaza, Chicago 1, Ill.

VACUUM DEGASSING EQUIPMENT

Centrifugal Casting Machine Co., Tulsa, Okla.

VALVE (Air, Oil, Water, Steam)

Airmatic Valve, Inc., 7317 Associate Ave., Cleveland 9, Ohio.

Cleco Pneumatic Tool Div. Reed Roller Bit Co., Houston, Texas.

North American Mfg. Co., 4455 E. 71st St., Cleveland 5, Ohio.

Numatics, Inc., Milford, Mich.

VALVES (Blow-off and Cut-off)

Champion Div. Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.

Cleco Pneumatic Tool Div. Reed Roller Bit Co., Houston, Texas.

C. B. Hunt & Sons Inc., Salem, Ohio.

VALVES (Oxygen, Acetylene)

Linde Air Products Co., Div. Union Carbide & Carbon Corp., 420 Lexington Ave., New York 17, N. Y.

VENTILATING — See DUST COLLECTING, VENTILATING, EXHAUST, COOLING SYSTEMS

VENTS (Corebox)

Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.

Demmler, Wm., & Bros., Kewanee, Ill.

C. M. Smillie & Co., 1124 Woodward Hghts. Blvd., Ferndale 20, Mich.

VIBRATORS

Adams Co., Dubuque, Iowa.

Beardsley & Piper Div. Pettibone Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill.

The Branford Co., 130 Chestnut St., New Haven 7, Conn.

Burgess-Sterbentz Corp., 3790 West 150th St., Cleveland 11, Ohio.

Chicago Pneumatic Tool Co., 6 E. 44th St., New York 17, N. Y.

Cleveland Vibrator Co., 2828 Clinton Ave., W., Cleveland 13, Ohio.

Davenport Machine & Foundry Co., Davenport, Iowa.

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

Foundry Supplies & Mfg. Co., 2221 Orchard St., Chicago 14, Ill.

Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.

Link-Belt Co., Prudential Plaza, Chicago 1, Ill.

Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee, Wis.

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, Ohio.

S P O Incorporated, 7500 Grand Division Ave., Cleveland 5, O.

Frederic B. Stevens, Inc., 18th St. & Vernor Highway, Detroit 16, Mich.

Tabor Mfg. Co., Div. Turbo Machine Co., Lansdale, Pa.

VISES (Hydraulic, Mechanical, etc.)

Desmond-Stephan Mfg. Co., Urbana, Ohio.

WASHES—See CORE and MOLD WASH

WEDGES (Foundry)

The Adams Co., Dubuque, Iowa.

WELDING APPARATUS (Electric Arc, Inert Gas)

Air Reduction Sales Co., 150 East 42nd St., Socony-Mobil Bldg., New York 17, N. Y.

Linde Air Products Co., Div. Union Carbide & Carbon Corp., 420 Lexington Ave., New York 17, N. Y.

WELDING, CUTTING and GOUGING APPARATUS and SUPPLIES

Air Reduction Sales Co., 150 East 42nd St., Socony-Mobil Bldg., New York 17, N. Y.

Linde Air Products Co., Div. Union Carbide & Carbon Corp., 420 Lexington Ave., New York 17, N. Y.

Liquid Carbonic Corp., 3110 S. Kedzie Ave., Chicago 23, Ill.

Wilson Welding Co., 221 High St., Altizer Addition, Huntington, West Va.

WELDING ELECTRODES (Carbon)

Becker Bros. Carbon Co., 3450 South Laramie, Cicero, Ill.

National Carbon Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

United States Graphite Co., Saginaw, Mich.

WELDING GAS—See GAS

WELDING RODS and ELECTRODES

Air Reduction Sales Co., 150 East 42nd St., Socony-Mobil Bldg., New York 17, N. Y.

Carborundum Co., Perth Amboy, N. J.

International Nickel Co., Inc., 67 Wall St., New York 5, N. Y.

Linde Air Products Co., Div. Union Carbide & Carbon Corp., 420 Lexington Ave., New York 17, N. Y.

WHEELBARROWS

Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

WHEELS (Abrasive Contact)

Chicago Rubber Co., 2620 North Clybourn, Chicago 14, Ill.

Keystone Abrasive Wheel Co., Carnegie, Pa.

WHEELS (Wire Brush)

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, Ohio.

WIRE CUTTERS

Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, Ohio.

WIRE NAILS

Republic Steel Corp., 3100 E. 75th St., Cleveland 27, Ohio.

WIRE ROPE

American Chain & Cable Co., Inc., 271 South Pennsylvania Ave., Wilkes-Barre, Pa.

WOODWORKING MACHINERY

DoAll Company, Des Plaines, Ill.

Oliver Machinery Co., Grand Rapids 2, Mich.

Shopmaster, Inc., 1214 South 3rd St., Minneapolis, Minn.

X-RAY EQUIPMENT

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

Ansco Co., 171 Clinton St., Binghamton, New York.

Picker X-Ray Corp., 25 S. Broadway, White Plains, N. Y.

X-RAY FILM and ACCESSORIES

Ansco Co., 171 Clinton St., Binghamton, New York.

Eastman Kodak Co., Rochester, N. Y.

Picker X-Ray Corp., 25 S. Broadway, White Plains, N. Y.

ZINC

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.

Henning Bros. & Smith Inc., 91 Scott Ave., Brooklyn, N. Y.

George Sall Metals Co., 2300 East Butler St., Philadelphia 37, Pa.

ZIRCON SAND

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.

Berkshire Chemicals, Inc., 420 Lexington Ave., New York 17, N. Y.

Carpenter Brothers, Inc., 606 West Wisconsin Ave., Milwaukee 3, Wis.

Orefraction Inc., 7425 Thomas St., Pittsburgh 8, Pa.

CLASSIFIED ADVERTISING

Help Wanted

WANTED

FOUNDRY SUPERVISOR

Prominent manufacturing organization in New Jersey, with long term expanding program has excellent opportunity for foundry supervisor. College education or equivalent desirable; man should be of good health and good character, with 10 or more years' experience in nonferrous foundry. Should be thoroughly familiar with all foundry practices including heat treating, welding, production planning, inspection, methods and development. Married man under 50 preferred, U. S. citizen, with general experience in cost reduction, industrial and human relations, personnel problems in foundry employing 500 people. Should be a good administrator. Good pay, many fine company benefits, including company paid insurances.

Send detailed resume to:

R. T. Hunt
WRIGHT AERONAUTICAL DIVISION
Curtiss-Wright Corporation
Main & Passaic Streets
Wood-Ridge, New Jersey

FOUNDRY ASSISTANT

Foundry assistant needed by captive Bronze and Aluminum foundry. Prefer experience in Bronze and Aluminum tablets, memorials and commercial castings must have experience in plant efficiency, planning, research and operation. Age 30 to 35, with approximately 12 to 15 years' experience.

Salary open and commensurate with qualifications. Good opportunity for the right man.
Give personal history, experience, references and salary expected.

BOX 287, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

DEVELOPMENT METALLURGIST

For alloy development projects in the production of cast irons and cast or wrought nonferrous products. Engineering degree and five or more years' practical experience with operating equipment and processes. Capable to conduct systematic and constructive metallurgical investigations in melting, alloying and casting. Fine opportunity for seriously interested young metallurgist to gain valuable experience and to qualify for future promotion in progressive, nationally known corporation. Confidential.

BOX 289, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

PATTERN SHOP SUPERVISOR

Semi-production gray iron foundry Central Indiana has position for young aggressive patternmaker who has desire to advance with an expanding organization. In reply give full qualifications.

BOX 301, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

DESIGNERS-DRAFTSMEN-ENGINEERS

Experienced in foundry layouts and equipment. Send experience record, personal data, recent photo and references prior to personal interview.

BOX 294, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

Help Wanted

COREROOM FOREMAN
MOLDING FOREMAN
COREMAKERS
MOLDERS

A jobbing and captive foundry specializing in producing large and heavy castings has positions available for Coreroom Foreman, Molding Foreman, Coremakers and Molders. A rapidly expanding concern with excellent opportunities for qualifying applicants. Located in the Upper Peninsula of Michigan. Must have experience producing large and heavy castings. Submit qualifications to:

BOX 224, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

FOUNDRY TECHNICIAN OR
QUALITY CONTROL
ENGINEERING ASSISTANT

Mechanized gray iron foundry in Ohio producing quality engineering jobbing castings. Applicant should have some technical background, training or experience in one or more of the following fields—Metallurgy, Cupola Control, Sand Control, Gating and Risering.
This position will offer many opportunities in increasing efficiency and control of all foundry operations including practical research, development and application on new foundry processes such as shell process and CO_2 process. Earnings will be dependent on qualifications and ability.

BOX 243, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

ASSISTANT FOUNDRY

SUPERINTENDENT

Want modern, control-minded Assistant Superintendent for Midwest Malleable Foundry producing mechanized and semi-production jobbing castings. Must think ahead and participate in modernization program while improving quality and reducing costs. Real opportunity and challenge at adequate salary and bonus. Reply giving personal data and salary requirements.

BOX 291, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

SALES ENGINEER

Steel jobbing foundry has excellent opportunity for an experienced sales engineer in the Northern Ohio area. Give full details in first letter.

BOX 297, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

CLEANING ROOM FOREMAN

Experienced in gray iron jobbing foundry. Located Middlewest.

BOX 275, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

FOUNDRY FOREMAN

For Southern Ohio gray iron foundry employing 90 men on production jobbing. Excellent opportunity for ambitious young man to supervise molding and coremaking. Send complete details including age, experience, salary desired, references, weight and height. Address: Box 281, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

GRAY IRON FOREMAN

Gray iron jobbing foundry near Cleveland needs a dry sand foreman for medium and large floor work. In reply give age, experience, references and include photograph. Address: Box 274, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Help Wanted

ASSISTANT CHIEF ENGINEER

MAGNESIUM FOUNDRY

We are a well established medium sized Chicago Foundry with an expanding operation under an aggressive management group.
We would like to receive a brief resume from you if you would like to join the management team. You should have experience in the engineering of aircraft quality magnesium sand castings. You should also be able to handle liaison work with customers regarding casting design and quality control problems.

Salary will depend upon experience.

All replies strictly confidential.

BOX 283, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

METALLURGIST OR

METALLURGICAL ENGINEER

For work in gray cast iron. B. S. Degree and some melting experience desirable. Duties would involve service and development work on alloys in iron. Moderate travel.

BOX 226, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

FACILITIES ENGINEER

ME degree or equivalent. Jobbing or production foundry experience. Challenging assignments, advancement opportunities, good salary and benefits. Location: New York State. Resume requested.

BOX 284, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

RESEARCH ENGINEER

Opening in nationally known research laboratory of nation's largest steel casting company. College graduate with 0-5 years' experience desired. Background in ceramics, chemistry, chemical engineering or metallurgy preferred. Opportunity for work in all phases of steel casting manufacture. Salary open. Write to: **J. A. RASSENFOSS, AMERICAN STEEL FOUNDRIES, EAST CHICAGO, INDIANA.**

NONFERROUS FOUNDRY FOREMAN

Rare opportunity for practical experienced man to affiliate with progressive company in growing non-seasonal industry. Medium size aluminum and bronze production foundry. Excellent salary plus benefits. Must relocate in southeast United States in city of half million plus. Send resume complete personal and professional background and recent photo. Address: Box 290, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

CLASSIFIED ADVERTISING

Help Wanted

CHIEF METALLURGIST

Chief metallurgist of executive caliber by long established large ferrous foundry in Chicago—Milwaukee area. Prefer man of medium age, grounded in ferrous castings with administrative potential. Compatible circumstances and good opportunity. State salary. Will consider confidential. Our employees know of this advertisement.

BOX 288, FOUNDRY

PENTON BLDG. CLEVELAND 13, OHIO

INDUSTRIAL ENGINEER

Wonderful opportunity for graduate engineer with foundry experience to assist modernization and cost reduction program in cast iron foundry. Send resume in confidence to:

WILLIAM I. PENTIN
PARKERSBURG RIG & REEL COMPANY
P.O. BOX 1160
PARKERSBURG, WEST VIRGINIA

FOUNDRY SUPERINTENDENT

Medium-size production jobbing gray iron foundry in Southern Ohio needs qualified practical foundryman to take complete charge of all foundry operations. Give full particulars in first letter including age, height, weight, experience, education salary requirements and references. Address: Box 280, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

TIME STUDY AND QUALITY CONTROL ENGINEER

Prefer between the ages of 25 through 35. Knowledge of sand laboratory and metallurgy desired but not required. Permanent job in ductile iron foundry in Southeast. Send snap shot and full resume with first letter. Address: Box 308, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY FOREMAN

For Southeastern ductile iron, brass and aluminum foundry. Must have served time as a molder. Prefer between the ages of 25 through 40. Excellent opportunity. Send snap shot and full resume. Address: Box 309, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

METALLURGICAL ENGINEER GRADUATE

Middle west commercial steel foundry needs theoretically trained engineer to help keep the organization abreast of technical developments, and to work on quality control programs. Proper applicant will be required to attend all technical society meetings pertaining to steel foundry activities. Address: Box 240, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

NONFERROUS FOUNDRY FOREMAN

Medium size aluminum foundry near Cleveland, specializing in medium and large jobbing work. Must know all phases of foundry operations and aluminum alloys. In reply, give age, experience, references, and include a photograph. Address: Box 395, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

RAPIDLY GROWING ENTERPRISE

Needs man capable of running its NONFERROUS FOUNDRY. Must be interested in improving existing methods and facilities and taking advantage of new developments. Should have sound metallurgical background and proven record of practical experience and managerial ability. Address: BOX 257, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Employment Service

FOUNDRY PERSONNEL SPECIALISTS

National Placement and Procurement of

GENERAL AND PLANT MANAGERS, PLANT SUPERINTENDENTS, FOREMEN—ALL DEPARTMENTS, METALLURGISTS, ENGINEERS, CONTROLLERS, ACCOUNTANTS, SALESMEN, SALES MANAGERS, PERSONNEL DIRECTORS, PURCHASING AGENTS.

Confidential Inquiries Invited

From Employers and Qualified Applicants.

For Fast Competent Assistance Contact

DRAKE PERSONNEL, INC. **HARRISON 7-8600**

JOHN COPE, DIRECTOR **220 SOUTH STATE ST., CHICAGO, ILL.**

Positions Wanted

MANAGER OR SUPERINTENDENT

Have forty years' practical experience in foundry, molder for sixteen years. Have been foreman, superintendent and general manager. Was superintendent of three largest foundries in St. Louis, Missouri, largest one in Chicago, Illinois. Understand gray iron, semi-steel, brass, aluminum, rigging jobs to get best production at lowest cost, cupola, also mix of various metals; estimating jobs from blueprints. Can give best of references. Available immediately. Address: Box 300, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT

Gray iron foundryman, molder by trade, metallurgist, 26 years' experience producing quality castings in high production and jobbing, to 40,000 lbs. Well versed in plain and alloyed irons for high tensile, sand control, cores rigging for production. Work from blueprints. Want connection with sound firm needing services of foundryman with ability and know-how. Address: Box 272, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MANAGER-SUPERINTENDENT

Practical gray iron foundryman, technically trained, graduate metallurgist, with broad background of experience in jobbing and production, machine tool, paper machinery, automotive. Well versed in metal and sand control, cores, cleaning etc. Very low scrap record, low production costs. Want connection with reliable firm demanding results. Address: Box 271, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT-MANAGER FERROUS FOUNDRY

Outstanding record of accomplishments of increasing production, profit and union control. Background—foreman, foundry engineer (process and industrial) and plant manager. Age 49. Married. Address: Box 286, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

DIRECTOR, GENERAL MANAGER ALUMINUM ALLOYS

Specialist in permanent molds, sand castings, aluminum alloys. Practical man, fifteen years' experience. English, early thirties seeks suitable position. States or Canada. Available soon. Address: Box 307, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

METALLURGICAL ENGINEER

Five years' supervisory experience malleable, pearlitic-malleable gray iron—includes melting, annealing, sand control. Desire responsible position with aggressive company. Address: Box 285, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

GENERAL FOREMAN CLEANING ROOM

Thoroughly experienced in all phases of Cleaning Room operations. Now employed. Wish to relocate. Would like position with future. Have good cost-quality-labor relations record. 35 years of age. Resume upon request. Address: Box 269, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

GRAY IRON FOUNDRYMAN

Available, thorough and practical, green and dry sand molding, coremaking, melting, costs, customer contacts, consulting and advisory work. Good handler of men, along in years. Plenty of know-how. Address: Box 293, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WORKS MANAGER-PLANT MANAGER

Thoroughly versed in all phases of ferrous and nonferrous foundry operations. Capable of producing efficiently and profitably. Address: Box 223, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Positions Wanted

FOREMAN

Thirty years' practical experience all phases foundry operations. Molder, foreman, superintendent. Excellent gating, risering, scrap control. Can produce at minimum costs. Address: Box 298, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT

Thirty years' experience, practical and technical, gray iron jobbing and production. Well versed all departments. Presently employed as superintendent. Address: Box 273, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

CLEANING SUPERVISOR

Five years time study, six years cleaning foreman and department head, steel and alloy castings. Best references. Good employee relations. Address: Box 303, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT OR GENERAL FOREMAN

Thorough knowledge of all phases of nonferrous metals. Practical man, 36 years' experience, molder, foreman, superintendent, well versed all departments. Available immediately. Address: Box 299, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Representatives Wanted

SALES REPRESENTATIVE

Large eastern malleable iron foundry interested in commission salesman to cover Ohio area. Replies confidentially treated. Personal interviews upon request. Write resume of experience.

BOX 277, FOUNDRY

PENTON BLDG. CLEVELAND 13, OHIO

Representative Available

AGENCY SEEKS TO REPRESENT

Progressive sales agency, currently representing a malleable iron foundry seeks to represent exclusively a reliable production nonferrous metals foundry for New York (including New York City) and New Jersey.

BOX 278, FOUNDRY

PENTON BLDG. CLEVELAND 13, OHIO

Opportunity

PERMANENT MOLD METHOD AVAILABLE THE WAGNER PERMANENT MOLD CO., 2910 Empire Ave., Burbank, California, has developed a Permanent Mold Method for ferrous and nonferrous metals and invites inquiries from any country regarding this method and process.

CLASSIFIED ADVERTISING

Foundry Consultant

ELECTRIC FURNACE CONSULTANT

BASIC AND ACID PRACTICE

Supervisor on electric furnaces for 35 years. Thorough knowledge of:

1. All kinds of plain carbon and alloy steel.
2. Analysis control.
3. High standard of physical properties.
4. Low Cost with high productivity.

EUGENE H. WEAK **2933 HIGHWAY AVE.**
HIGHLAND, IND. **PHONE: TEMPLE 8-1244**

FOUNDRY ENGINEERING

Equipment Arrangements
Foundry Costs
Application of techniques for maximum production economies.

CLYDE L. FREAR
3509 OLD DOMINION BLVD.
ALEXANDRIA, VIRGINIA
PHONE TEMPLE 6-8082

Foundries For Sale

FOR SALE

Well known, old established soil pipe manufacturing business with long record of profitable operation. Annual sales 12,000 tons. Buildings covering 86,000 sq. ft. are in good condition. Large addition made in 1954. 12.8 acres of land. Plant served by two railroad sidings. Machines and equipment in good condition. Staffed by well trained management and employees.

Located in Delaware Valley area. Convenient to Philadelphia and New York.

BOX 302, FOUNDRY

PENTON BLDG. **CLEVELAND 13, OHIO**

FOR SALE

GRAY IRON FOUNDRY

East-Central Ohio

Gray iron foundry suitable for cope and drag, squeezer, floor and bench molding. Gas core ovens. 72" cupola 85,000 square feet on 10 acres. Property fenced. Buildings sprinklered. Plus labor area in agricultural community. Convenient rail facilities.

BOX 244, FOUNDRY

PENTON BLDG. **CLEVELAND 13, OHIO**

SMALL FOUNDRY FOR SALE

Well-equipped foundry in Eastern Pennsylvania. Has overhead crane, cleaning equipment. Plenty of adjacent land. On railroad. Address: Box 279, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOR SALE

Modern brass and aluminum foundry. Building tile and glass construction. 4200 square feet. 950 feet covered storage. Overhead crane, five furnaces. Located in Midwest. Address: Box 306, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOR SALE OR LEASE

Small aluminum and brass foundry. Fully equipped, with two small furnaces for small castings. Present owner may be able to buy some castings if produced. Address: Box 304, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Foundry Wanted

WANT TO BUY

Interested in buying a small to medium-size foundry producing Niresist, Nihard and similar heat, corrosion and abrasion resistant castings. Please submit complete details in first letter in strict confidence. Address: Box 295, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Wanted-To-Buy

WANTED

1000 pound capacity tiltfurnace for melting aluminum. Prefer oil fired with crucible. Complete with blower and controls. Send details and specifications to:

G. TEPLANSKY
1407 EAST 40th STREET
CLEVELAND 3, OHIO

WANTED

Two L.F.Y., D.E. melting furnaces complete with panel boards and transformers. 250 K.V.A. Transformers, 2500 Amperes, 100 No load voltage Conical shaped shells.

LOCK BOX K
RAVENNA, MICHIGAN

MIXERS WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price or immediate acceptance. Address: Box 578, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WANTED

Osborn-Roto-Lift Molding Machine, Model 3161. Address: Box 255, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

For Sale

FOR SALE

1—27/36 Wheelabrator, iron belt
1—No. 1, 4 ft. Wheelabrator, table 6-15", spinner tables
1—48/42 Wheelabrator tumblast 17½ cu. ft.
1—#1 G.F. Pangborn air barrel 1½ cu. ft.
Several sizes hand blast cabinets
Several sizes dust collectors
1—25/36 Leeds-Northrup homo-carb-furnace, 2 sets baskets, instrument panel, new retort
1—Lindberg draw furnace, 28/36
1—gas fired degreaser
1—Wilson Rockwell hardness tester
1—Toledo 200 lb. bench scale.

F. D. RICHARDSON & CO.
12925 AUBURN AVENUE
DETROIT 23, MICHIGAN

FOR SALE

Approximately 110 Steel Bins, 21" deep, 24" wide, 38½" long, outside measurements. Ideal for handling castings with Fork-Lift, after welding angle iron on bottom. Approximate weight 140 pounds each. Price $15.00 each, f.o.b. our plant.

BOX 282, FOUNDRY

PENTON BLDG. **CLEVELAND 13, OHIO**

FOR SALE

1—Simpson Mixer, #2, 20 HP motor
Miscellaneous: Screens, Pulverizers, Grinders, Tyler Rotap Screens etc.
Wanted: Your Idle Machinery.
OUR 39th YEAR

CONSOLIDATED PRODUCTS CO., INC.
66 BLOOMFIELD STREET
HOBOKEN, NEW JERSEY

HO 3-4425 **N. Y. TEL. BA. 7-0600**

For Sale

FOR SALE

469 Palmer-Bee casting cooling bucket. 30" inside diameter, 20" deep. ½" steel plate bottom. 3/16" steel plate sides perforated for cooling with steel bales of ¾" x 2" bar.

CENTRAL FOUNDRY DIVISION
GENERAL MOTORS CORP.
DANVILLE, ILLINOIS

FOR SALE

Two Clark Utilitrucs. 1947 models with 42" forks. 6000 lbs. capacity. Good condition. $1,500 each.

GENERAL FOUNDRY & MFG. CO.
P.O. BOX 7037
FLINT, MICHIGAN

FOR SALE

Good Used Steel Flasks
30 Popular Sizes
From 9½" x 15" to 17½" x 21"
Send for list and prices

NEWTON FOUNDRY COMPANY
NEWTON, IOWA

FOR SALE

1—S.P.O. #2166—16" cylinder
1—S.P.O. #9946—trunnion rollover
1—S.P.O. #SC10DA hollow core machine
1—B&P #30-14-PCA Rol-A-Cor, automatic
1—B&P #7 Mulbaro

FOUNDRY SUPPLY COMPANY
7600 HIGHWAY NO. 7
MINNEAPOLIS, MINNESOTA

FOR SALE

Used Sutorbilt 20 x 55 Rotary Blower rated 40.7 C.F.R., arranged to run at 329 RPM and deliver 9000 CFM at 3.0 psig with 142 BHP. 150 HP, 885 RPM motor required. Blower complete with relief valve, 18" intake silencer and V-belt drive, but less motor. New 1953, used two years, good condition.

THE CLEVELAND-CLIFFS IRON COMPANY
PURCHASING DEPARTMENT
ISHPEMING, MICHIGAN

FOR SALE

1—48 x 48 Heavy Duty American Wheelabrator Tumblast capable of handling castings up to and including 250 lbs. including complete electrical equipment for 440 volt, 60 cycle, 3 phase current. Serial #A-25079.
1—American Tumblast Loader complete with electrical equipment for 440 volt, 60 cycle, 3 phase current.

BOX 296, FOUNDRY

PENTON BLDG. **CLEVELAND 13, OHIO**

FOR SALE

2—Hausfeld tilting brass melting furnaces, oil or gas burner, 825# cap., complete with blower $550.00 each. 1—Reda furnace, 550# series, electric screw tilt, oil fired with blower and oil pump, $1200.00. 1—3 ton Yale spur geared chain fall, $65.00. 1—Pangborn type AV hose blast machine $125.00. Address: PORTSMOUTH FOUNDRY CO., 2707 JOHNSON ST., PORTSMOUTH, VIRGINIA.

FOR SALE

Cheap, never used No. 2½ iron cupola with blower and motor, 5 HP. For details call or write: DEMPSEY & KOLIE FOUNDRY, 6311 EAST 31ST STREET, KANSAS CITY 28, MISSOURI, WA. 3-3934.

CLASSIFIED ADVERTISING

For Sale

FOR SALE

We have the best selection of HARD CHROME REBUILT PNEUMATIC TOOLS WE HAVE EVER HAD.

Ingersoll-Rand Size 24 Floor Rammers
Ingersoll-Rand Size 14 Bench Rammers
Cleco Bench Rammers
Chipping Hammers—All types
Core Breakers and Grinders

Our prices are about half the cost of new tools. All tools sold by us are guaranteed and can be returned if found not satisfactory.

Repair and Rebuilding Service on all Pneumatic Tools

CENTRAL PNEUMATIC SERVICE COMPANY
512 LINDEN AVE., DAYTON, OHIO
TELEPHONE: MADISON 2701

FOR SALE

NEVER USED AIR HOISTS

INGERSOLL-RAND
One ton and two ton, packed in original crates.

Save up to $175.00 Each

HOMAN MACHINERY COMPANY
824 REEDY ST.
CINCINNATI 2, OHIO
MAin 1-4634

FOR SALE

MOTORS—GENERATORS
TRANSFORMERS
Unused — Rebuilt
WORLD'S LARGEST INVENTORY
ELECTRIC EQUIPMENT COMPANY
Phone Station Collect GLenwood 6783
P.O. Box 51—Rochester 1, New York

FOR SALE

1—Roots-Connersville Blower 14 x 36, model RCDH, maximum delivery 8000 CFM at 3.5 PSI. Complete with Foxboro control equipment and Burgess-Manning snubber, catalogue #STC-L-16 and Allen Bradley electrical control equipment and 60 HP motor. Purchased new in 1951.

MEECH FOUNDRY, INC.
9906 MEECH AVENUE CLEVELAND 5, OHIO
MICHIGAN 1-5550

FOR SALE

General Electric heat treat furnace 20" dia. 24" deep, air circulated, 1800°, 1200 gal. oil circulating tank, 1300 gal. water quench tank. Draw furnace 20" x 24", 1600°, complete with switches, controls, recorders. Excellent condition. Price right. Also have American #85 dust collector; A type D, size 16 Roto-Clone; and a Type D, size 24 Roto-Clone. All in good condition and bargains. Address: Box 276, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

For Sale

FOR SALE

TURBO BLOWERS WITH MOTORS

CFM	PRESS.	MAKE	CFM	PRESS.	MAKE
12300	24oz.	Spencer			
8375	20oz.	Spencer	380	16oz.	No. Am.
6000	32oz.	Ing.-Rand	340	20oz.	A-B
4700	32oz.	Ing.-Rand	320	12oz.	Spencer
2500	7oz.	Sturt.	9000	6"SP	Northern
1300	16oz.	Spencer	3420	8"SP	N.Y.
800	13oz.	Buffalo	2700	⅝"SP	Ilg
400	12oz.	Buffalo	2500	½"SP	American
450	7oz.	Spencer	1100	4½"SP	Bayley
400	16oz.	No.Am.	2344	2"SP	Clarage

THE MOTOR REPAIR & MFG. CO.
1552 HAMILTON AVE.
CLEVELAND 14, OHIO

FOR SALE

2—Automatic Shell Closing Machines—Link Belt Design .....ea. $300.00
1—36" Shot Blast Tumble Machine with Dust Collector $1500.00
Link Belt Company V Flexmont Oscillating Conveyor 50' x 12" $450.00
1—Tabor Roll Over, 14 x 20 ..... $75.00
143 ft. double track Westover Conveyor 24" high, 45 metal pallets 18 x 72—3 bar, all as new, 65% of new price
1—4000 gal. oil tank, ⅜ thick, excellent condition $300.00
1—Two ton rotary oil furnace for iron or steel, 75 minutes per ton guaranteed $5000.00
16 ft. Handy Handler belt conveyor with motor $135.00

BAMBER FOUNDRY, INC.
MARKET STREET
STAMFORD, CONNECTICUT

FOR SALE

I two ton electric arc furnace, complete, less transformer and panel board. Cheap and quick removal.

BOX 249
PENTON BLDG. CLEVELAND 13, OHIO

FOR SALE

One #6 Whiting Cupola purchased new in 1942 complete with Whiting Skip Hoist Charger. Available for inspection.

THE FOREST CITY FOUNDRIES CO.
CLEVELAND 13, OHIO

FOR SALE

14 Tabor 10", Stationary or movable, Jar, Top Squeezer, Molding Machines.

LACONIA MALLEABLE IRON CO.
LACONIA, NEW HAMPSHIRE

FOR SALE

Lehmann single muller mixer. 80" dia. Very good condition. Muller not pitted. Reasonably priced.

MID-WEST MINERAL CO.
BOX 225
QUINCY, ILLINOIS

FURNACES FOR SALE

Ten used heat treating furnaces and two 7-ton gantry cranes. Good condition, priced to sell. Address: BAER STEEL PRODUCTS, INC., BOX 1428, BOISE, IDAHO.

For Sale

FOUNDRY MACHINERY AND EQUIPMENT BOUGHT AND SOLD

One piece or a complete foundry

Prompt Action

Mullers—Rollovers

Squeezers—Slingers

Flasks — Blowers — Grinders

Wheelabrators, etc.

HOMAN MACHINERY COMPANY
824 REEDY ST.

CINCINNATI 2, OHIO
MAin 1-4634

FOR SALE

4 Newaygo Super Handy Sandy units complete with driving motors, steel service platforms and access ladders. Model SHS-7-G single hopper, air operated, discharge gate and swing chute. 43 cubic feet lower storage and 120 cubic feet overhead. These units, bought new in January, 1956, never used, due to change in operations. Will sell singly or as a group. Sand handling capacity 35 TPH each.

MARION MACHINE, FOUNDRY AND SUPPLY CO.

P.O. BOX 989

MARION, INDIANA
PHONE 412

FOR SALE

Moulders' Friend Sand Cutter, purchased new March 1953—Motors 220-60-3. Available October 15, 1956.

BLANCHESTER FOUNDRY CO.
BLANCHESTER, OHIO

FOR SALE

1—#3 Demmler core blower with rollout table, Good condition.
3—International jolt rollover and draw, 20" x 8"
2—International hand rollover core machines, 14" x 8", hand draw
2—Milwaukee #12 stationary jolt squeeze
2—Waukesha 3 wheel Payloaders, solid tires

FOUNDRY PRODUCTS, INC.
834 WEST 49TH PLACE
CHICAGO 9, ILLINOIS

FOR SALE

1—14 cu. ft. 36" x 48" type GK-2 Pangborn Rotoblast. 230 V DC. Can be seen in operation.

T. B. WOOD'S SONS CO.
CHAMBERSBURG, PA.

FOR SALE

Slightly used Allis-Chalmers 5 KW Foundromatic Dielectric Core Dryer. Address: EMPIRE PATTERN & FOUNDRY COMPANY, P.O. BOX 1647, TULSA, OKLAHOMA. B. R. KINCADE.

CLASSIFIED ADVERTISING

For Sale

FOR SALE

Jolt Squeeze Strip Molding Machines
#213 SPO—19 x 26; 4½" jolt cyl. 13" sq.
#2114 SPO—14 x 24; 11" sq. cyl.
#2136 SPO—13" sq. cyl.
#720 U Osborn—31 x 44; 11" sq. cyl.

Jolt Rollover Molding Machines
Tabor 30" x 40"; extends to 69"; 12" draw; shockless type; 1000# cap.
#204704 Osborn, 18" x 24"; stationary
#601 Osborn; 750 lb. cap. 30" flask
#602 Osborn; 750 lb. cap. 36" flask
#605 Osborn; 750 lb. cap. 54" flask

Jolt Strip Molding Machine
#559 Osborn—25 x 30; 1200 lb. cap.

Jolt Squeezers
Osborn—#275J; 16 x 20"; 10" sq. cyl.
Osborn—#276J; 17 x 26"; 13" sq. cyl.
SPO—#113J—17 x 26"; 13" sq. cyl.

Core Blowers—Core Rollovers
#193 Osborn—for medium cores
#94 Osborn—for large cores
#4 Demmler Core Blowers
Osborn Hand Rollovers—Model 42

Material Handling Equipment
Model HA Hough Payloader
Clark Fork Lift Truck—6000 lb.
Elwell Parker Fork Lift Truck—4000 lb.
Mercury Fork Lift Truck—2000 lb. Elec.
Lewis-Shepard Platform Lift Trucks

Furnaces
Stroman—2000 lb. Tilting Hydraulic
Fisher—2000 lb. Aluminum

Core Ovens
Dielectric—Model 900A and 1800A. Set up in your shop in operating condition. Less than ½ price.

Miscellaneous Foundry Equipment
350 lb. Detroit Rocker Barrel Furnace—Complete
U.S. 7½ HP 3 speed grinder; 28" wheel
Model S—B & P Screenerator
Royer Screenerator
Climax Wire Straightener
Model AA American Sandcutter
2 ton capacity jib crane

FOR THE BEST DEAL CALL
BALCHER MACHINERY COMPANY
695 E. 152ND STREET
CLEVELAND 10, OHIO
TELEPHONE: GLENVILLE 1-2474

FOR SALE

2—Only continuous flow American Wheelabrator Tumblast machines. These machines have never been used and can be purchased for a fraction of their original cost.

2—Used Sandblast cabinets with dust collectors.

2—Used Vacu-Blast machines

3—Used 2 ton Yale hoists

1—30" diameter Pangborn Roto-Blast with dust collector.

This equipment all in excellent condition.

PACIFIC MARINE SERVICE
BLDG. 10, SWAN ISLAND
PORTLAND 18, OREGON
PHONE—BU 9-5749

FOR SALE

One Tabor Yoke type jar, squeeze strip molding machine, Ser. #-M-121314204616 P.B.I.
Dia. squeeze cylinder 16"
Dia. Jar cylinder 6"
Dia. Draw cylinder 4"
This machine was purchased new in April 1955 and used only 8 hours in production. Due to a change in production items we have no further use for this machine. Does an excellent job on stack molding.

ALLOYED GRAIRON CASTINGS CORP.
RAVENNA, MICHIGAN

For Sale

FOR SALE

MOLDING MACHINES
1—Tabor 22" Power Jolt, Rollover, Draw, Portable, 22" x 32" Table.
1—Herman, Jolt, Rollover Draw, 6000#, 40" x 60" table.
2—International, Jolt, Rollover Draw, 24" x 10G, Stationary.
2—No. 275 Osborn jolt squeezers. Stationary.
2—SPO Jolt Squeeze strip—13"
CORE OVENS
1—Coleman Recirculating 3 section with 5 drawers per section. Gas fired.
1—Coleman Recirculating 4 section with 5 drawers per section. Gas fired.
1—Forbeck Recirculating, gas fired, double end, thru-drawer type.
BLOWERS FOR CUPOLAS AND FURNACES
1—Connersville rotary blower, 6000 CFM.
1—Connersville Rotary Blower, 3500 CFM.
2—#7½ Roots rotary blowers—27 x 81—14000 CFM.
2—Connersville Rotary 14" x 27" HD, 2750 CFM at 5# press.
Maxon-Premix Blowers for Gas ¼ to 1 HP.
2—2 HP 20 oz. Spencer Turbine Blowers.
1—Spencer Turbine Blower, 2700 CFM, 27 oz., 30 HP, 3/60/220-440 V.
METAL MELTING EQUIPMENT
1—1000# open flame brass melting furnace, gas fired.
1—Hausfeld Stationary Brass, oil or gas burner, 200# cap.
1—Hausfeld Tilting crucible, gas, 250# A1, Cap.
1—Hausfeld 2000# aluminum capacity furnace, barrel type, open flame, oil fired.
MISCELLANEOUS
2—Hydro-Blast barrels with 25 HP pumps.
3—Jib cranes, 16' swinging beam, 2000# cap.
1—Sly Tumbler 24" x 42".
1—International SB-11 core blower.
2—Pangborn cloth screen collectors, 2 HP.
1—Stoney crane type shakeout.
1—NDP Royer sand separator.
1—#16 Roto-clone unit complete.
1—15 HP Sullivan Compressor, complete.
Complete stock of rebuilt mill and dust exhaust blowers.

CLIFTON MACHINERY COMPANY
1023 W. SIXTH ST. CINCINNATI 3, OHIO

For Sale

HIGHEST BID SALE

Because of a Surplus of Sand Blasting Equipment we are offering the following stock to the HIGHEST BIDDER. DEALERS INVITED. Awards to be given Nov. 15, 1956
1 48x48 Wheelabrator Tumblast
3 42x48 Wheelabrator Tumblast
1 36x42 Wheelabrator Tumblast
1 15" Wheelabrator Continuous Tumblast
1 Pangborn Table E.S.421 Shell Machine
1 Pangborn 14 GK 2 Rocker Barrel

Following Not Included

BOUGHT	SOLD	TRADED
48 x 48 Wheelabrator Tumblast	.....	$5,000
42 x 48 Wheelabrator Tumblast	.....	2,500
36 x 42 Wheelabrator Tumblast	.....	3,000
27 x 36 Wheelabrator Tumblast, Steel or Rubber Belt	.....	3,000

Pangborn E.S. 347-4 wheel grit blast unit used for motor heads or motor blocks, good condition, $8,000 FOB Detroit
Vapor Blast Cabinets, Singles $600.00
Vapor Blast Cabinets, Doubles 900.00
Filters for American Dustube Collector .50 each
All types and sizes of Hand Cabinets; Dust Collectors; Pressure Tanks, Rooms; Horizontal or Vertical Tumbling Barrels and additional sand blast equipment too numerous to mention.

PHONE OR WIRE
DIAMOND SALES, INC.
5654 W. JEFFERSON
DETROIT 9, MICHIGAN
PHONE: VI-36750

PUBLIC AUCTION SALE

LATE TYPE MECHANIZED GRAY IRON FOUNDRY MACHINERY AND EQUIPMENT

Formerly Property of
PAUL WEINER FOUNDRY

On These Premises

810 WESTERN MUSKEGON, MICHIGAN
WEDNESDAY, OCTOBER 17th at 11:00 A.M. E.S.T.

Air Compressors	Sand Conveyors
Tumbling Barrels	Jolt Squeeze Pin Strippers
Swing Frame Grinders	Jolt Pin Strippers
Wheelabrators	Jolt Squeeze Clamp Power Rollover Draw
Snagging Grinders	Jolt Rollover Power Draw
Double End Grinders	Jolt Squeezers
Core Blowers	Molding Hopper Lines
Core Rollovers	Sand Mixers or Mullers
Core Ovens	Bucket Elevators
Core Grinders	Sand Screens
Core Racks	Revivifier
Core Wire Straightener	Sand Bins
Cupolas and equipment	Shakeout
Mold Conveyors	Sand Storage Cylinders
Roller Conveyors	Laboratory equipment

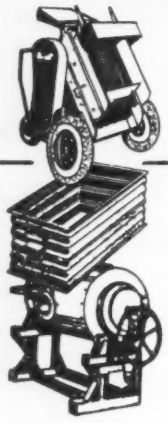
Flasks, Hoists, Material handling equipment, Hand tools, Fans, Clocks, Office furniture and equipment, Pattern shop equipment, and many items too numerous to mention.

INSPECTION DATES: Mon. Oct. 15 Tues. Oct. 16
From 9:00 A.M. to 4:00 P.M.

WRITE — WIRE — PHONE For Free Descriptive Circular

NORMAN LEVY & COMPANY
DEARBORN 2-4178 AUCTIONEERS 100 W. Monroe St., Chicago

Circle 846 on Inquiry Card—Page 219



EUCLID FOUNDRY & MACHINE EQUIPMENT CO.

14919 SARANAC ROAD — CLEVELAND 10, OHIO

ANNEALING FURNACE
Loftus Engineering, Pusher type, gas fired, recirculating complete with all controls overall dimensions: 45′ lg. x 10′ wide x 12′ high

MOLDING MACHINES
Jolt Squeeze Strip
2—#724 Osborn Pinlift, 24″ squeeze cyl., 10″ draw
2—#24-54D Nicholls Framelift 24″ squeeze cyl., 8″ draw

CORE OVEN
1—Steiner Ives Co., gas fired, recirculating, Wheelco Controls, 88″ wide x 48″ deep, 7′ high, 4 horizontal counterweight doors.

SAND SLINGER
B & P Motive Jr., 19″ head, 4″ tip, 15 ft. arm, 6 ft. ramming unit, 2 speeds, raising and lowering arm.

ASK FOR OUR COMPLETE LISTING!!

TUMBLING MILL:
60″ x 72″ Ransohoff tumbling type wet cleaning mill, Serial No. 6318, drive 15 HP. bucket loader 5 HP 3/60/220

MAGNESIUM CLEANING CABINETS:
7—Whirlpool Duplex, 800 CFM, 100″ wide x 65″ deep x 90″ high. Buffalo exhausters—7½ HP., 220/440

FOR SALE NOW: In Bellville, Ohio, 10 miles south of Mansfield a complete Gray Iron Foundry with No. 7 Whiting cupola, 18,000 sq. ft., with railroad siding.

WE BUY AND SELL ONE PIECE OF EQUIPMENT OR COMPLETE FOUNDRIES

Telephone . . . Glenville 1-1222

GUARANTEED FOUNDRY EQUIPMENT

Circle 847 on Inquiry Card—Page 219

CLASSIFIED ADVERTISING RATES

(Effective July 1, 1956)

POSITION WANTED—Minimum advertisement set solid, 30 words or less, $3.50. Additional words 15c each.

ALL OTHERS — "Help Wanted"—"For Sale"—"Wanted-To-Buy", etc., minimum advertisement set solid, 30 words or less, $8.00. Additional words 30c each.

NOTE—If replies are to be sent to a box number in care of FOUNDRY, add 8 words to your advertisement for box number and address.

Any advertisement set in all capital letters, add 50% to the above rates.

INCH RATES PER INSERTION

Single Column 2¼″ Wide	One Time	Three Times	Six Times	Nine Times	Twelve Times
1 inch	$ 22.20	$ 21.00	$ 19.80	$ 19.20	$ 18.60
2 inches	43.20	40.80	38.40	37.20	36.00
3 inches	63.00	59.40	55.80	54.00	52.20
4 inches	81.60	76.80	72.00	69.60	67.20
5 inches	99.00	93.00	87.00	84.00	81.00
6 inches	115.20	108.00	100.80	97.20	93.60
7 inches	130.20	121.80	113.40	109.20	105.00
8 inches	144.00	134.40	124.80	120.00	115.20
9 inches	156.60	145.80	135.00	129.60	124.20
10 inches (1 col.)	168.00	156.00	144.00	138.00	132.00
15 inches (½ page)	243.00	225.00	207.00	198.00	189.00
20 inches (2 cols.)	312.00	288.00	264.00	252.00	240.00
30 inches (full page)	450.00	414.00	378.00	360.00	342.00

Remittance should accompany advertisement when submitted —Cash Discount 2%, 10 days.

Classified Forms Close the 13th of Month Preceding Issue

FOUNDRY

PENTON BUILDING • CLEVELAND 13, OHIO

ANOTHER ACME LIQUIDATION!!

SPENCER FOUNDRY DIVISION

PARK and FIRST STREETS

WILLIAMSPORT, PENNSYLVANIA

Phones 9161-9162 Williamsport

A Complete Gray Iron Foundry

One of the Larger Production Foundries in the East, over 200,000 square feet.

Everything must be sold!

The building must be prepared for other uses as quickly as possible!

The following is a partial list of the thousands of items offered for sale—Send for our more complete list or better yet come over and see for yourself!

2—Whiting #10 Cupolas
2—Whiting #9 Cupolas
2—14000 C.F.M. Cupola Blowers
3—Simpson #3 Mullers
1—B. & P. #70 Muller
1—B. & P. #60 Muller
4—Mold Conveyors—1 with 48″ x 84″ cars
3—Synchronous Air Compressors up to 300 H.P.
30—Molders hopper system
28—Molding Machines—Nichols, Milwaukee, Osborn, Davenport
2—40 H.P. Slingers
2—25 H.P. Slingers
2—Slinger Turntables
8—Shakeouts
65—Air Hoists
6—Core Grinders
6—Fox Single Wheel Grinders
10—Core Blowers
4—Wheelabrators
5—Tumbling Barrels
Laboratory Equipment
Complete Pattern Shop

Ladles, 200 ton flasks, air tools, yard switching engine, magnets, monorails, trolleys, bridge cranes, core plates, chaplets, foundry supplies and alloys, thousands of feet of flat and troughing sand belt conveyors, thousands of feet roller conveyors, and other items too numerous to mention.

Please write for our illustrated circular.

WRITE • WIRE • PHONE

ACME EQUIPMENT COMPANY, INC.

DIRECT ALL INQUIRIES TO LIQUIDATION OFFICE

Park & First Streets, Williamsport, Pennsylvania; Phone: 9161-9162 Williamsport

Main Office: 126 S. Clinton Street, Chicago 6, Illinois; Phone: ANdover 3-3430

AAA MACHINERY & EQUIPMENT CO.

over 1000 satisfied customers

WORLD'S LARGEST INVENTORY OF GUARANTEED FOUNDRY EQUIPMENT

AIR COMPRESSORS

1—CHICAGO-PNEUMATIC Size 7½ x 6 Single Stage horizontal, 20 HP Motor, Starter etc, 220/440 volts.
2—GARDNER-DENVER Model ADR, 4" stroke, 15 HP Motor & electrical 220/-440/3/60 cycles 125 PSI pressure, w/-storage tanks. New in 1950's.
1—SULLIVAN Type WN-3 size 20" x 12" x 14", 1220 CFM, 250 HP, AC Motor.

AIR HOISTS

1—INGERSOLL-RAND, Size C 2000 lb.
75—INGERSOLL RAND RC-5, 500 lbs.
10—INGERSOLL RAND LC-7, 700 lbs.
3—INGERSOLL RAND Size "AN" 500 lbs.
6—INGERSOLL RAND Size "BN" 1000.
1—INGERSOLL-RAND Size "D", 4,000 lbs.
15—DETROIT, 1 and 2 ton cap.
15—APPLETON air hose reels, swivel base, 50', and 75 capacities.

ELECTRIC HOISTS

1—Comet 1000 lbs. capacity.
1—SHAW Box 1000 lbs. capacity.

BUCKET ELEVATORS

1—LINK BELT 30' Centers, 10" x 7" Buckets, w/Motor and Drive.
1—LINK BELT 35' Centers, 12" x 7" Buckets, w/Motor and Drive.
1—LINK BELT 50' Centers, 16" x 8" Buckets, w/Motor and Drive.

CUT-OFF MACHINES

1—DEWALT model ME2 cut-off saw, 10 HP motor, 24" Carboloy blades.
1—TABOR model C10AF, Abrasive Disc, 16" Wheel, 10 H.P. Motor.
1—GROB Band Saw. Type OS-36, open end, 36" throat. MD.
3—TESSMER "I" Sprue Cutters.

CORE WIRE AND ROD STRAIGHTENERS

1—AMERICAN Type D Pneumatic Rod Straightener and Shear. 1¼" capacity.
1—CLIMAX #3, ¼" to ⅝", Length 10".

CORE GRINDERS

2—MILWAUKEE Rotary Type, Model 70-12. 70" Dia. Table. Very Late.
1—STONEY core grinder, 16" dia. wheel, 48" travel, 5 HP AC motor.

CORE BLOWERS

2—CHAMPIONS CB 10, Max. Core 10 lbs.
2—CHAMPIONS CB 400, Max. Core 300.
1—DEMMLER No. 1, Max. Core 10 lbs.
2—DEMMLER No. 2K, Max. Core 20 lbs.
2—DEMMLER No. 2E, Max. Core 20 lbs.
2—DEMMLER No. 2, Max. Core 20 lbs.
2—DEMMLER No. 3, Max. Core 35 lbs.
2—DEMMLER No. 3K, Max. Core 35 lbs.
2—DEMMLER No. 3E, Max. Core 35 lbs.
1—DEMMLER No. 4, Max. Core 100 lbs.
1—DEMMLER No. 4E, Max Core 100 lbs.
2—INTERNATIONALS No. SB, 11 Max. Core 15 lbs.
2—INTERNATIONALS No. SB 13, Max. Core 30 lbs.
2—OSBORN No. 92, Max. Core 35 lbs.
2—OSBORN No. 192, Max. Core 50 lbs.
2—OSBORN No. 193, Max. Core 75 lbs.
6—MILWAUKEE TACCONE Model A-3, Max. Core, 4 lbs.

CORE KNOCKOUT SYSTEM

Consisting of: Simplicity 3' x 8' Shakeout, 24" x 60' Belt beneath Shakeout, Inclined Belt 24" x 105' with 18" x 24" Dings Magnetic Pulley & MG Set, Jeffrey 24" x 20" Double Roll Crusher, & 25 Ton Capacity Storage Bin.

CORE OVENS

1—COLEMAN Car Type Mold Oven 15'W x 8'H x 20'L Gas & Oil Combination Burners, Re-Circulating, with all controls.
1—COLEMAN Model #1 Jr. Gas Fired Portable Core Oven, drawer type, 5 drawers, 3 burners, with controls.
1—INDUCTION Heating Dialectric Model M-800A, 600 lbs. per Hr. New.
1—INDUSTRIAL "Revolving Carriers" Continuous, Trays 18" x 80", Gas Fired.
1—YOUNG BROS. 2-Comp. 10 Drawers, Overall 9' x 12' x 8', Gas Fired.
1—MAEHLER SINGLE COMPARTMENT I.D. 96" L x 80" W x 84" High, Gas Fired Recirculating, L & N Controls.
2—DIETERT #500 LAB DRYING TYPE.

CUPOLAS, BLOWERS & ACCESSORIES

1—WHITING No. 7 Cupola, with Loader, Controller, Motor and Blower.
1—WHITING No. 3½ Cupola, with Loader, and Blower. NEW 1953.
1—ROOTS CONNERSVILLE, Size 20 x 44, 7000 CFM, Type HD, 50 HP Motor.
4—LINDBERG Centrifugal Blowers 2100 CFM, with 15 HP Motors.
1—BASIC REFRACTORIES BRI Gun, Model 110. For cupola lining.
5—WHITING 42" Dia. Charging Buckets.
1—CUPOLA Bondactor. For lining.
1—I & R Single Stage FS-367, 100 HP, 9400 CFM.
2—WHITING No. 9 Cupolas with I & R FS-357 Blowers 50 HP, NEW 1944.
2—I & R Type FS 365 Turbo-Blowers, 50 HP, 8150CFM.
1—WHITING 150 HP Centrifugal Blower, 12,800 CFM with Foxboro Air Weight Controller.

DUST COLLECTORS & ROTO-CLONES

1—AMERICAN AIR FILTER No. 20, Type N Rotoclone Dust Collectr, Arrangement C, with sludge ejector.
1—AMERICAN Air Filter No. 12, Type W, arrangement "C," with Sludge Ejector.
1—AMERICAN Air Filter No. 14, Type W, arrangement "C," with Sludge Ejector.
1—AMERICAN Air Filter No. 27, Type W, arrangement "C," with Sludge Ejector.
2—AMERICAN Air Filter Type N, Size 10 with Bench. For Grinding.
1—AMERICAN Air Filter Type N, Size 24, 24,000 CFM, 75 HP Motor.
3—AMERICAN AIR FILTER Type W, Size 30, Arrangement "C," with Sludge Ejector.

ELECTRIC ARC MELTING

2—AJAX #500 Nose Tilt Furnaces, 3000 cycle. Used with Induction MG Set.
1—AJAX #300 Nose Tilt Furnaces, 3000 cycle. Used with Induction MG Set.
2—DETROIT Rockers, Indirect Arc. Type AA, 750-1000 lbs. capacity. Complete with 200 KVA Transformers. Control Panels, Automatic Electrode Holders.
2—DETROIT Rockers, Indirect Arc, Type AA, 1000-1500 lbs. capacity. Complete with 358 KVA Transformers. Control Panels, Automatic Electrode Holders.

GAS & OIL FIRED FURNACES

2—LINDBERG-FISHER Model MNP, Size 300, electric tilt, with motor and blower.
6—LINDBERG FISHER Model MNP, Size 1700, Electric Tilt, Motor & Blower.
3—LINDBERG FISHER Model MNP, Size 2400, Electric Tilt, Motor & Blower.
2—LINDBERG FISHER, Type BB1, Size 25, Hand Tilt, with Motor & Blower.
12—LINDBERG FISHER, Model SSH, Size 550, Stationary, Motor & Blower.
6—LINDBERG FISHER, Model SSH, Size 150, Stationary, Motor & Blower.
3—LINDBERG FISHER, Model SSH, Size 60, Stationary, Motor & Blower.
10—CAMPBELL HAUSFIELD, Stationary, Size 125 to 250, Motor & Blower.
2—CAMPBELL HAUSFIELD, Model 1PNT, Size 2000 lbs., Electric Tilt, with Motor & Blower.

GRINDERS—SWING FRAME

1—MARSHKE, 12" x 2", 3 HP.
1—MARSHKE, 20" x 10", 10 H.P.
2—FOX, No. 6, 24" x 10", 15 H.P.
1—MARSHKE 24" x 10", 15 HP motor.

GRINDERS—SNAGGING

2—U. S. ELECTRICAL, No. 64, 14" x 3" Wheel, 7½ HP, 4-Speeds.
1—HAMMOND, Model WR-1, 24" x 3" x 12" Wheel, 10 HP.
2—SAFETY RITES, No. 174, 24" x 3" x 12", 10 HP.
2—MARSHKE Model LGZAH 24" x 4" x 12" Wheel, Double End 20 HP Multiple

GRINDERS—DISC

1—BEASLEY #372 Vertical Spindle Dry Grinder, 53" dia., 20 HP. New 1952.
1—QUEEN CITY, Model 100 Double End, wheel size 20" x 2" x 2", with 10 HP
1—U. S. ELECTRIC, No. 80, Double End, Wheel size 16" x 3", with 7½ HP Motor.

HEAT TREAT FURNACE

2—LINDBERG, Model 4860 GH, Gas Fired 48" x 60", Recirculating, with L & N Controls to 1250° F.
1—LOFTUS ENGINEERING CORP. Annealing, Walking Beam Type, Gas Fired, 1600°, Recirculating, 10' x 12' x 40'.

LADLES

12—MODERN pouring devices, Models F-9 and FA-9, with tapered covered ladles. 400 to 800 lbs. capacity.
3—WHITING Cylindrical, 275 lbs. 19" x 26".
2—MODERN Cylindrical, 1500# 29" x 30".
1—MODERN mixing, 44" x 44", on wheels, 4000 lbs.
2—STEVENS Cylindrical, 2450 lbs. 29½" x 41½".
9—WHITING Lip Pour, 1200 lbs., 23" x 23".
6—MODERN Lip Pour, 1600 lbs. 24" x 24".
2—WHITING Lip Pour, 2000 lbs. 29" x 29".
2—WHITING Lip Pour, 7000 lbs., 41" x 41".
1—WHITING Lip Pour, 8000 lbs., 44" x 48".
1—WHITING Lip Pour, 10 ton 62" x 62".
1—WHITING teapot, 4000 lbs., 32" x 32".
1—WHITING Lip Pour, 40 ton capacity.
7—WHITING Bottom Pour 48" x 48", 4 Ton Cap.
1—WHITING Lip Pour 7 Ton Capacity.
1—MODERN 3 Ton Cylindrical Mixing Type, Electric.

MOLDING MACHINES JOLT SQUEEZERS

2—MILWAUKEE No. 104, 10" cyl., portable.
2—MILWAUKEE No. 123, 12" cyl., stationary.
6—MILWAUKEE No. 181, 18" squeeze cyl. 24" x 36" table.
8—OSBORN No. 275 JW, Straddle Type, 10" Cyl., Portable.
16—OSBORN No. 275J, 10" Cyl., Portable.
3—OSBORN No. 276J, 12" Cyl., Portable.
6—OSBORN No. 210 PJ, Swing Back Head, 10" Cyl., Stationary.
6—OSBORN No. 212 PJ, Swing Back Head, 12" Cyl., Stationary.
1—CHAMPION No. JS-10-P, 10" Cyl., Swing Back Head, Portable.
20—SPO No. 110J. 10" Cyl., Portable.
6—TABOR 10" cyl. portable and stationary

JOLT ROLLOVER PATTERN DRAW

1—DAVENPORT model 24SA, 24" x 30" table. 12" draw, 1200 lbs. capacity.
1—DAVENPORT No. 28 SA, 29" x 40" table, 1500 lbs. cap., 12" draw.
1—DAVENPORT No. 34 SA, 34" x 48" table, 2500 lbs. cap., 15" draw.
1—DAVENPORT No. 28R, 34" x 48" Table, 12" Draw.
1—DAVENPORT No. 40-SA, 42" x 50" Table, 3000 lbs. Jolt, 18" Draw.
1—HERMAN #6000 Series, 42" x 78" Table, 6000 lbs. Jolt Cap., 20" Draw.
1—HERMAN #1500 Series, Table 26" x 30", Jolt 1500 lbs.
1—HERMAN 10,000 Series 54" x 108" Table, 20" cyl. 10,000# Jolt.
2—HERMAN Hi-Speed Jar, 1500 lb. series, 26" x 48" table.
1—HERMAN #750 Series, Table 20" x 30", 750 lbs. Jolt.
2—HERMAN #4000 series, 40" x 60" table, 13" jolt cyl.; 4000 lbs. cap.
6—INTERNATIONAL "R" Core Rollovers.
1—INTERNATIONAL "G" Size 20" x 8".
1—INTERNATIONAL "G" Size 24" x 10".
1—INTERNATIONAL "G" Size 30" x 12".
1—INTERNATIONAL RES. Size 15" x 8".
1—INTERNATIONAL Type "F," 31" x 54", Draw 16", Jolt Cap. 2500 lbs.
4—JOHNSTON & JENNINGS model 918, 44" x 54" table, 20" draw, 2000 lbs. cap.

WRITE FOR OUR COMPLETELY NEW CATALOG OF USED FOUNDRY EQUIPMENT.

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over 1000 satisfied customers

WORLD'S LARGEST INVENTORY OF GUARANTEED FOUNDRY EQUIPMENT

1—JOHNSTON & JENNINGS 815-B table 30" x 40", draw 15", jolt 1500 lbs.
1—MILWAUKEE #167, Table 32" x 33", Draw 12", Jolt 1000 lbs., Sq. Cyl. 16".
1—MILWAUKEE 217 table 35" x 41", sq. cyl. 16", draw 12", jolt 1200 lbs.
1—MILWAUKEE Model 60B-3, 60" flask, 18" draw.
10—OSBORN No. 40 and 42, Hand Core Rollovers, 18" x 8" Draw.
1—OSBORN No. 342, Table 23" x 38", Draw 10", Jolt 1000 lbs.
1—OSBORN No. 442, Table 21" x 31", Draw 10", Jolt 600 lbs.
1—OSBORN No. 242W, Table 29" x 42", Draw 19", Jolt 1500 lbs.
2—OSBORN No. 405, Table 57" x 64", Draw 26", Jolt 3000 lbs.
6—OSBORN No. 601, 30" wide Flask, 10" Draw, 750 lbs. Jolt.
6—OSBORN No. 602, 36" Wide Flask, 10" Draw, 750 lbs. Jolt.
2—OSBORN No. 332, Flask Size 26" x 36", Draw 9", Sq. Cyl. 16", 1500 lbs. Jolt.
1—SPO No. 413D. Table 24" x 25", Draw 10", Jolt 600 lbs., Sq. Cyl. 13".
1—SPO model 506, portable, 24" x 30" table. 10" draw, 600 lbs. capacity.
3—TABOR, Size 30" x 40" Table 12" Draw 1000 lbs. Jolt Cap. Stationary.
4—TABOR, Size 22" x 32", Draw 10", Jolt 600 lbs.

JOLT PIN LIFT

2—DAVENPORT model 24 AJS, 24" x 30" table, 8" draw, 1000 lbs. capacity.
1—DAVENPORT No. 40 AJS, Table 44" x 54", Jolt 4000 lbs., Draw 18".
2—MILWAUKEE Model 2542, 38" x 42" table, 12" draw, 3000 lbs., jolt cap.
2—OSBORN No. 559, Table 25" x 30", Draw 6", Jolt 1200 lbs.
1—OSBORN No. 563, Table 55" x 63", Draw 12", Jolt 7000 lbs.
1—SPO model 307, 24" x 30" table, 8" draw, 1000 lbs. capacity. Portable.
1—J & J 68SP, 24" x 30" table, 6" draw, 1000# Jolt.

PIN LIFT

1—INTERNATIONAL Model LP 6, 8" draw, 750 lbs. cap.
1—INTERNATIONAL LP 10, 30" x 30" flask, 1000 lbs. cap.
2—MILWAUKEE No. 620 ND, 24" x 30" table, 2000 lbs. cap.

JOLT SQUEEZE PIN LIFT

1—INTERNATIONAL PKL, 12" Squeeze Cyl., 6" Draw.
1—MILWAUKEE No. 163, Table 15" x 24", Draw 8", Jolt 1500 lbs., Squeeze Cyl. 16".
2—OSBORN No. 710J Table 17" x 21", Squeeze Cyl. 10".
1—SPO 2114, table 20" x 27", 4" draw, 600 lbs. jolt, 11" cyl.
1—SPO 2146, table 21" x 31", 6" draw, 14" cylinder, portable.
1—SPO 2136G, table 19" x 26", 6" draw, 13" cyl. portable.

JOLT (BUMPERS)

1—HERMAN, 40" x 60" Table, 13" Cyl. 6000 lbs. Jolt.
1—TABOR, Table 30" x 40", 2800# cap.
1—HERMAN 8' x 12' Table, 20" Cyl, 10,000# Jolt.

MATERIAL HANDLING EQUIPMENT

1—BLAW-KNOX ½ yard clamshell bucket, single line.
1—INGERSOLL RAND, Size MHU, Air Winch, 2000 lbs. Cap.
6—LEWIS SHEPPARD Platform Hand Lift Trucks (For Core Room).
1—LINK BELT car puller, #5 capstan.
1—HOUGH Model HA Payloader, hydraulic lift, 12 cu. ft. bucket.

CONVEYOR BELTING

1600'—HEWITT-ROBINS 30" wide, 5 ply rubber covered. Used.
100'—HEWITT-ROBINS 18" wide, 8 ply elevator. Never Used.
80'—LINK BELT Distributing Belt Conveyor, with (8) Molders Hoppers, with plows and gates, for Squeezer system.

CONVEYOR BELT—BUILT TO YOUR SPECIFICATIONS

24" wide, either flat or trough idlers, Timken bearings, take-ups, motors and speed reducers, any designated speed. All material used, with exception of steel.

STEEL APRON CONVEYOR

1—LINK BELT 36" x 100' centers, motor and drive.
1—LINK BELT 30" wide by 128' Apron Type Sorting Conveyor complete w/motor & Drives. On 36" High Stands.

VIBRATING CONVEYOR

1—LINK BELT Model PA 36" x 40' Oscillating Conveyor, with 5 HP Motor. Used less than 6 months—LIKE NEW.
3—SIMPLICITY Model OA-10-A, 36" x 15'.

PORTABLE TROUGH CONVEYOR

1—FARQUHAR, 18" x 35'.

OSCILLATING CONVEYOR

1—LINK BELT 48" x 154'.

ROLLER CONVEYOR

800'—MATHEWS 22" Roller Conveyor, 2¼" Dia., 6" centers, 4" channel iron, complete with stands. LIKE NEW.
200'—MATHEWS 6" Roller Conveyor, 2½" dia., 3" centers, 4" channel iron. Heavy Duty.
500'—MATHEWS 48" Wide Rollers, 5" Dia., 1½" shaft, 12" centers, on 6" channel.
300'—MATHEWS 16"-18" & 20" Wide Rollers, 2⅞" Dia. 4" centers.

CHAIN CONVEYOR

500' JARVIS No. 678, complete with drives.

UNDER CAR UNLOADER

1—FARQUHAR, 18" x 30'.

TRAMRAIL

3—LOUDEN MONORAIL SYSTEMS, "Super Track"
(1) 110' of 6" I-beam & two 20' bridges
(2) 140' of 6" I-beam & two 12' bridges
(3) 130' of 11" I-beam & two 30' bridges: All Complete.
1—AMERICAN TRAMRAIL system with (1) 1 ton 20' span underslung bridge, and 150' of 12" tramrail, with air reels.
4—AMERICAN TRAMRAIL 2 ton cap. 20' span underslung bridge cranes.
2—AMERICAN TRAMRAIL 4 ton cap, 20' span underslung bridge cranes. Chain gear travel, complete.

OVERHEAD CRANES

1—WHITING 5 ton Overhead Crane, 50' span, Cab Operated, AC.

MOLD DRYERS

1—PORBECK Mold Dryer, 42" wide, 8' long, oil fired, Serial No. 242.

MOLD CONVEYOR

1—WEBB 109 Cars, Car Tops 32" x 39".

SAND MULLERS

1—BEARDSLEY & PIPER No. 50 Speedmuller, with Loader and Dust Hood, 50 HP Motor.
1—LINK BELT 48" x 8' Paddle Type.
1—BAKER PERKINS No. 16½, 30 HP.
1—CLEARFIELD, #610 Batch, 6 Cu. Ft.
1—SIMPSON, #1 Style B, Single Wheel, 400# Batch.
1—SIMPSON, #3 Style C, Enclosed Gears —3000#.
1—SIMPSON #2, Style UD, 1500 lbs. Batch. With Loader.
1—SIMPSON, #2, Style C, 1500 lbs., with Loader. Enclosed Gears.
1—DRAVO-DOYLE 6 Cubic Feet Capacity Wonder Model, portable, 5 HP 220-440.
1—SIMPSON No. 1½, style UD, with loader. 700 lbs. batch.

SAND PREPARATORS

6—ROYER Sand Conditioning Units, consisting of:
(1) 1' x 5' Royer Shakeout
(1) Farquhar 18" x 30' Conveyor underneath Shakeout
(1) Royer Model NDS Sand Preparator.
6—B & P Screenarators, Models S, M & L.
1—PEKAY Aerator, Model 320-3. (For Sand System).
8—ROYERS, Models NDP-C-2, NC-4, NDS.
1—SIMPLICITY LP 2'x3', Portable, 3 HP.

SAND CUTTERS

1—AMERICAN Model AA 5'2" Blade.
2—AMERICAN Model M, 79/60.
1—AMERICAN, Model M-Size 99/80.
1—AMERICAN, Model M-Size 89/70.
1—MOULDERS' Friend 60" brush.
1—AMERICAN SandMaster 72"/102".

SAND SLINGERS

2—JEFFREY Swivel type Flask Filler Booms.
1—B & P, 19" Tractor Type, 13' Arm.
1—B & P, 16" Tractor Type, 13' Arm, Magnetic Tower, 4' Ramming 4" Tip.
2—B & P, Model 16S-DB Stationary Type, 16" Head.
2—B & P Swing Type Slingers, 16" Head.
1—B & P Stationary, Double Belt 4' Impeller, 22" head, 5" tip w/50 HP Motor, 10' Jib Arm, 1948.
2—B & P Stationary, Double Belt, 4' Impeller, 19" Head, 4" Tip, 6' Jib Arm.
3—PLATE FEEDERS—7' Diameter x 18' Depth, with 10 HP motor & reducer.

SCALES

1—FAIRBANKS-MORSE Open Dial 6250# Cap. Platform 48" x 72".

SHAKEOUTS SCREENS

1—SIMPLICITY 4' x 10' Model D, 16,000#.
1—HEWITT-ROBINS 36" x 78", Vibrex.
1—LINK BELT 5' x 10' heavy duty.
1—SIMPLICITY 6' x 8' Model DE, 16,000#.
3—SIMPLICITY 4' x 10' Model B Single Deck Sifter Screens, with 10 HP Motors.

TUMBLING BARRELS

2—SLY 42" x 72" Square, 10 HP, Gearhead with Built-in Brake. Timken Bearing.
2—SLY 36" x 84" Type C, 7½ HP. Gearhead Built-in Brake. Timken Bearing.
4—WHITING 48" x 72", 10 HP Gearhead, with Built-in Brake. Timken Bearing.
1—SLY 48" x 96" w/Motor & Drive & Mag. Brake, Timken Bearing.
1—SLY 72" x 120" w/Motor ½ Drive & Mag. Brake, Timken Bearing.

SAND BLAST EQUIP.

1—AMERICAN 86" diameter swing table with dust collector.
1—AMERICAN No. 3 tablast, 4-48" auxiliary tables.
1—AMERICAN No. 1 tablast 7-14" auxiliary tables.
1—AMERICAN 27" x 36" Tumblast with skip hoist, shot return & electrical.
1—AMERICAN 36" x 42" Tumblast with Skip Hoist, Shot return & electrical.
1—AMERICAN 42" x 48" Tumblast, with Skip Hoist. Shot return & electrical.
1—AMERICAN 48" x 48" tumblast, with loader. New belt, excellent.
1—HOLLINGSWORTH Model 44" x 48".
1—HYDRO-BLAST cabinet, 40 HP motor and pump.

TESTING EQUIPMENT

1—GENERAL ELECTRIC X-RAY, Industrial Type. Model KX10, 140 KW.

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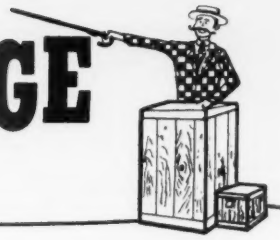
THE ACME BARGAIN PAGE



AIR COMPRESSORS
Ingersoll Rand Type 10, 800 CFM, 2 stage air compressor, 200 HP, 220 V motor. Rebuilt 1952.

BLOWERS
Ingersoll-Rand Type FS. Single Stage 4000 CFM @ 3.75 PSI, 100 HP, 220V G. E. Induction motor.
General Electric 7500 CFM, 20 oz., 89.6 Max. HP, 220V motor, Airway controls.
Ingersoll-Rand turbo compressor 10500 CFM @ 20 oz. 85 HP G. E. 220V 3500 CFM motor.

BUCKET ELEVATOR
40′ National, 5 x 8 buckets

CONVEYORS, VIBRATING
Os-A-Veyor 2—24″ x 24″ section with 6′ grizzley

CORE BLOWERS
3—International SB 12.
4—International SB 13.
10—Osborn 193.
1—Osborn 2035-2.
1—Champion CB 400.
2—CB 10 Late Type.

CORE GRINDERS
4—Milwaukee 70-9.

CORE OVEN VERTICAL HORIZONTAL
1—Coleman, combination oil or gas fired 43 carriers 24″ x 90″—1 hour 12 min. to 4 hours 48 min. cycle.
1—Coleman, combination oil or gas fired 43—2 shelf carriers 30″ x 144″ long. 2 hour 12 min. to 7 hour 24 min. cycle. Present replacement cost over $90,000.

CORE PASTE OVENS
2—Coleman Gas Fired 28′-25″ x 42″ opening.

CRANES
2—Northern 5 ton 40′ span, 22′ lift, 220 V. A.C.
1—Whiting 5 ton 40′ span, 22′ lift, 220 V. A.C.

ELECTRIC MELTING FURNACES
Detroit Electric 1500#—Kuhlman 13200 volt transformer complete with controls.
Detroit Electric 350#—Kuhlman 13200 volt transformer and controls.

FURNACE TRANSFORMERS
We have Electric Furnace Transformers in stock from 800 KVA to 2500 KVA. Write us your needs.

GRINDERS
Horizontal Disc (Flat) Grinders:
Gardner #186, 30″ dia. disc. 10 HP, 220/440V, with dresser, wet or dry grinder.
Double End Disc:
1—U.S. 18″ wheels, 2 swing tables.

GRINDERS, SNAGGING
2—Hammond 10 WRI D. E. Snag. 20″ dia. wheels. 10 HP 220/440 v motors, variable speed drives.
1—3″ x 24″ U.S. #65, 20 HP 220/440V.

GRINDERS, SWING FRAME
2—3″ x 24″ x 12″ Fox #4, 15 HP.
1—3″ x 24″ x 12″ Marschke, 20 HP.
1—3″ x 24″ x 12″ U.S. 15 HP.

HOT METAL CARRIERS
3—1 ton D.C. Cab operated Cleveland, Monotractor Hot Metal Carriers.

MOLDING MACHINES
Jolt Squeezers:
5—Milwaukee 103-11 Staty. Jolt Squeezers, 13½″ x 20″ table.
7—Champion JS10P Portable Jolt Squeeze molding machine, 18″ x 21″ table.
10—Osborn 275J.

Jolt Squeeze Pin Lifts BIG
2—Milwaukee Jolt Squeeze Strippers, Model 163-50, 15″ x 24″ table 16″ X open end pattern size.
1—Milwaukee 126-3 Jolt Squeeze Pin Stripper, 27″ x 21″ table, 8″ draw. Portable.
2—#165 Milwaukees.

ROLLOVERS
1—Herman 4000# Series 30″ x 60″ table.
1—Herman 3000# Series 40″ x 84″ table, special slotted table.
1—Herman 1500# Series 20″ x 36″ table.
2—Herman 750# Series 20″ x 30″ table.
2—Herman 750# Series 20″ x 24″ table.
1—Davenport 24 SA Jolt Rollover Pattern Draw. 26″ x 42″ flask size, 12″ draw.
3—Spo Model 9032.
1—Milwaukee 217.
2—International Type G, Portable, 20″ x 8″ draw.
3—Tabor Portable Rollover 30″.
Johnson & Jennings 1020-44 x 44 max. Flask Size.

PIN LIFT PUSHOFFS
1—Champion Pin Pushoffs 28″ x 42″ table 10″ draw.

1 No. 2 Simpson Muller UD.

OVENS, CORE
Despatch Type S, 2 cars 27½ x 54 x 64, Gas Fired.

OVERHEAD TROLLEY CONVEYORS
5000′ Jervis B. Webb & Link Belt 658 chain, 4 D.C. motor drive and MG set.

POURING DEVICES
3—Pouring devices, Whiting 500#.

ROTOBLAST
Pangborn 6′ dia. 6LF14 with dust collector

SAND SLINGERS
B & P Motive Jr. Slinger 19″ 2 speed head
B & P Stationary, 16″ head

SANDBELT CONVEYORS
144′-30″ Flat with Drives.
47′-30″ Trough with Drives.

TUMBLING BARRELS
3—Royersford 42′ x 72′ Roller Bearing, Chain Drive.
1—Sly Square 42 x 42 x 64.
1—Sly 42″ Dia. x 56″.

WIRE STRAIGHTENERS
American type F Rod Straightener
Climax 2A

WHEELABRATORS
1—27″ x 36″ Rubber Belt Wheelabrator

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MONA

UNIVERSAL REBUILT EQUIPMENT GUARANTEED

AIR COMPRESSORS

COMPLETE STOCK—BURY, PENNSYLVANIA, SULLIVAN, INGERSOLL-RAND —SEND YOUR REQUIREMENTS

BLOWERS

25—CENTRIFUGAL, 16 oz., 2 to 5 HP
10—GE, WILBRAHAM-GREEN, FISHER Positive Pressure and Cent. Cupola Blowers

CLEANING EQUIPMENT

1—AMERICAN WHEELABRATOR TUMBLAST 1945, 48" x 72", with Skip Loader, Vert. bucket conveyor, motors & controls

1—AMERICAN WHEELABRATOR TUMBLAST, 48" x 48" w/loader
1—AMERICAN WHEELABRATOR TUMBLAST, 42" x 48" w/loader
1—AMERICAN WHEELABRATOR TUMBLAST 36" x 42" w/loader
1—AMERICAN WHEELABRATOR TUMBLAST 20" x 27", w/rubber belt and Dust collector, plus new spare belt
1—PANGBORN TABLAST, 8' Table
1—PANGBORN ROTOBLAST, #BVR-5
1—PANGBORN ROTOBLAST, #28, Type GK
1—PANGBORN BLAST CABINET, #EP-5
3—TANNEWITZ METAL CUTTING BANDSAWS, 30" and 36"
1—CRESCENT METAL CUTTING BANDSAW, 30"
4—BURRING BENCHES, Magnesium cleaning, 9' L x 30" H x 30" W

CONVEYORS

1—LINK BELT, vibrating, double deck, 80' x 24", w/exhaust hood
1—LINK BELT, 21'6" x 24", with drive
1—LINK BELT, Car type mold, 114 cars, 403' track, car size 18" x 42"
1—JEFFREY, 3 compartment, ingot mold
4—SAND ELEVATORS, Various sizes
6—SAND BELTS, 10' ctrs. to 140' ctrs.
2500 FEET—FOUNDRY TYPE ROLLER CONVEYOR—ALL SIZES

CORE BLOWERS

2—DEMMLER #2, vert. or horiz.
1—DEMMLER #2A
1—DEMMLER #3K
1—DEMMLER #55, Late Model
2—OSBORN #91, #92
2—OSBORN #192, #193
1—CHAMPION CB-12
1—CHAMPION, Model CB-400
1—INTERNATIONAL SB-13
1—OSBORN Core Rollover, #136-3, (NEVER USED)

CUPOLAS

2—WHITING #5 complete with Skip Charger and Blower
2—MODERN #6 w/skip & blower
2—WHITING #8
1—MORRIS #9, Skip charger, Blower, Mixing Ladle, Never Installed
1—SKIP CHARGER for #9 Cupola with scale and buckets

DUST COLLECTORS

4—ROTOCLONE, #12, Type N, wet type
1—ROTOCLONE #14D w/Filter
1—ROTOCLONE, #16W
2—ROTOCLONE, Size 20D, Hopper type F
1—ROTOCLONE, Type W, 30" w/precleaner

1—PANGBORN, Style 635, 7800 CFM, 15 HP
1—AMERICAN DUSTUBE, #45 Bag Type

FLASKS

150 HINES AND FREEMAN ALUMINUM, Popoffs and Jackets
200 TRANSITE CORE PLATES, Various Sizes
SEND US YOUR REQUIREMENTS

FURNACES—DIRECT ARC MELTING

1—3,000#/hr. LECTROMELT 23,000 V
1—3 ton/Hr. "LECTROMELT", Top Charge
1—6 Ton/hr. HEROULT

FURNACES—INDIRECT ARC

1—350#/hr. DETROIT, Complete
1—1500# DETROIT ROCKER, Complete

FURNACES—INDUCTION MELTING

2—333 KW, AJAX-TAMA-WYATT, 1500# Alum., 60 cycle
1—30 KW, LEPEL
1—20 KW, AJAX SPARK GAP, High Frequency
1—6 KW AJAX
1—3 KW, AJAX, Lab type

SPECIAL OFFERING

SAND HANDLING SYSTEM
1—NATIONAL ENGINEERING 5 Station, handles 18,000/hr. Includes: 5 Air operated hoppers, 4½' x 4' storage hopper, 11' Shaker type "Lo-Veyor" refuse hopper, 3' x 20" mag. separator, SIMPSON #1½ MULLER. NEW 1952. Never used in production.
HEWITT ROBINS COKE SYSTEM
1—42' Vibrating CONVEYOR, 2 VIBREX COKE SCREENS, 3 Storage Hoppers, FAIRBANKS SCALE
THESE UNITS SPECIALLY PRICED FOR IMMEDIATE REMOVAL—CAN BE SEEN ERECTED NOW!

FURNACES—GAS & OIL

1—FISHER MNP, Gas, Tilting, 1700# cap. Mag.
2—FISHER, Gas, Stationary, 4 Burner, 500# cap.
4—FISHER MNP, Oil, Tilting, with blowers, 500# cap. Alum.
4—FISHER MNP, Oil, with blowers, 1500# cap. Brass
3—FISHER, Oil, Stationary, model 125, type S, Brass
1—REDA, Gas #550
1—DEMPSEY, Reverberatory, 10,000#, 9' W x 14' L x 9' H, Oil
1—HAUSFELD, Tilting, 1200# capacity
1—HAUSFELD, Gas, Stationary, 1000#
1—HAUSFELD, Gas, Stationary, 70-80# Alum.
1—CAMPBELL-HAUSFELD, Gas, 100-125 Crucible
1—SKLENAR, Oil, 600# Cap.
1—STROMAN, Gas, Tilting, 1,000# cap. Alum., auto control, hyd. lift

MOLDING MACHINES

Jolt Rollovers

1—J & J #1020, 50" x 60", 20" draw
1—J & J #920RC
2—J & J #918
1—J & J #815, 30" x 40", 15" draw, 1200# jolt
1—J & J #612, 24" x 30", 12" draw
2—INTERNATIONAL, 13 x 17" table, 6" draw
1—INTERNATIONAL, Type G, 24" x 10"
1—HERMAN 10,000#, 48" x 109" table
1—HERMAN 6000#, 42 x 78"
1—HERMAN 3000#, 30" x 66" Table
2—HERMAN 1500#
1—HERMAN 750#, 30" x 36"
1—OSBORN, 712 PJ, 18 x 28"
1—OSBORN #602, 36" x 26"
2—OSBORN #405-86, with levelling carriage
1—OSBORN #405, 3,000#, flask size 64" x 50", 18" draw
1—OSBORN #333
1—OSBORN #332
2—OSBORN #243, 28 x 40", 20" draw
4—OSBORN #142, 15" x 20", hand draw
4—TABOR, 40 x 60", 2000 & 3000# capacity
1—TABOR, 30" x 40" with air clamps
3—TABOR 22" x 42", pattern draw, shockless, portable
1—TABOR, 20 x 30" w/air clamps, 1000#
2—TABOR, 14" x 16" Rockover
1—SPO ROCKOVER #506

Bumpers

1—OSBORN #102
2—DAVENPORT, 30" x 30" table
1—DAVENPORT, 24" x 27" table
1—HERMAN, 60 x 72" table

Jolt Strippers

1—J & J, 30" x 24" table, 600# cap.
2—SPO #305, 20" x 27" table, 750# cap.
1—HERMAN, 22" x 30" table, #4317
1—TABOR, 20" x 20" table, hand strip
1—MILWAUKEE #1536, 32" x 38"
1—INTERNATIONAL 1255 PKL
1—OSBORN #559

Jolt Squeeze Strippers

1—OSBORN #175, 21" x 18", portable
1—MILWAUKEE #165
2—MILWAUKEE #163

Jolt Squeezers

2—MILWAUKEE #105JS, 17 x 21", portable
8—SPO #110J, Portable
3—OSBORN #276-J, Cantilever
10—OSBORN #275-J, Portable
8—OSBORN #275PJ, Stationary
2—OSBORN #712PJ, Stationary
2—INTERNATIONAL, #12 LJS
4—TABOR, 3" Jolt, 17 x 20"

MULLERS AND MIXERS

1—SIMPSON #0, 3' Dia., 1½ to 1¾ cu. ft.
1—SIMPSON #1, 4' Dia., 4 cu. ft.
1—SIMPSON #2, Unit Drive, 6' dia., 14 cu. ft.
1—SIMPSON #3, 8' Dia., 25 to 30 cu. ft.
1—B & P SPEEDMULLER, #30, 3'10" dia., 3 cu. ft.
1—B & P SPEEDMULLER, #40, w/loader, 4'6" dia., 5 cu. ft.
1—B & P SPEEDMULLER #50, w/loader, 5'2" dia., 7½ cu. ft.
1—B & P SPEEDMULLOR, #80, 6'6" Dia., 24 cu. ft.
1—CLEARFIELD, #920, 9' Dia., 25-30 cu. ft.
4—BAKER PERKINS, #4A

LADLES AND POURING DEVICES

MODERN, SWINDELL, WHITING, TREADWELL—All Types and Sizes—Ready for your Needs!

OVENS

1—COLEMAN, Elec., 5 drawers, 6' W x 7' H x 8' L
1—COLEMAN, Oil, one compartment, recirc., 60" W x 80" H x 14'6" L
FDY adv 530 5½pt CLEMENS 9-17—
2—ROSS, Gas, 2 compartment, recirc., rack type, 6½" x 14' x 7'
1—YOUNG BROS. elec., 3 compartment, Kiln type
3—GENRICH, elec., 3 drawer, preheating, auto-control, 9' H x 8' W x 6'7" L

SAND CONDITIONING

3—B & P SCREENERATORS Model L, M and S
1—ROYER PREPARATOR, Comb. Model RC, 40 Ton/hr. Scrap removal, 9' x 9' hopper
5—ROYER, NB-2, 12" Belt
1—ROYER SAND BLENDER, 12" belt
1—JEFFREY SANDITIONER, PORTABLE

UNIVERSAL MACHINERY AND EQUIPMENT CO.

1630 N. Ninth St., Reading, Pa. **Phone 3-5103**

TREMENDOUS SAVINGS

IF PURCHASED FROM PRESENT LOCATION

Before Dismantling

CHICAGO, ILLINOIS

1—HOUGH Model HE Payloader, 16 cu. ft. bucket cap., New 1951.

1—DAVENPORT Model 28-SA Jolt Rollover Pattern Draw Machine, New 1947, 29" x 40" table, 12" pattern draw, 1500 lb. jolt cap.

1—DAVENPORT Model 28-AJS Jolt Pin Lift Machine, New 1947, 30" x 38" table, 10" draw, 1500 lb jolt cap.

1—BEARDSLEY & PIPER #30 Speedmullor.

1—SIMPSON No. 0 Sand Muller.

2—SULLIVAN Vertical Air Compressors, 40 HP Motor, 180 CFM, New 1951, 220/440/3/60 electrical.

400' MATHEWS 24" Roller Conveyor, above rail, 4" centers, 4" channel, $2\frac{9}{16}$" roller dia., $\frac{1}{16}$" shaft, heavy duty, 10' sections.

2—BEARDSLEY & PIPER Model "M" Screenerators.

1—ROYER Model NC-2 Sand Conditioner.

1—COMPLETE Sand Testing Laboratory.

30 Sets of 28" x 30", 8" cope, 16" drag. STERLING Steel Flasks.

1—INGERSOLL RAND Size D-6 Air Hoist, 6000 lb. cap.

2—YALE & TOWNE Fork Lift Trucks, 3-ton capacity, Model K-23E-6, New 1948, with Ready Power units.

1—DEMMLER #50 Core Blower.

1—COLEMAN JR. #3 Gas Fired 4-drawer Core Oven.

1—Crane Scale, 3500 lb. cap.

1—BEARDSLEY & PIPER Model DB Stationary Sandslinger, 19" head, 4" tip, 8' jib arm, 6' ramming unit, with 2-ton cap. B & P Plate Feeder, New 1948.

2—MILWAUKEE #40 Jolt Rollover Draw Machines, 12" draw, 1500 lb. jolt capacity.

1—PANGBORN Model 14-GK-2 Rotoblast Barrel, 43' long by 48" dia. drum size, with Skip Hoist loader.

1—MILWAUKEE #54 Jolt Rollover Draw Machine, 12" draw, 2000 lb. jolt capacity.

BRIDGEPORT, CONN.

2—AMERICAN AIR FILTER #30 Type W Rotoclone Dust Collectors, Arrange. C, with sludge ejectors, 50 HP Motors.

1—INGERSOLL RAND Centrifugal Cupola Blower, 50 HP Motor, with Airweight Controller, 220/440/3/60.

1—SIMPLICITY Dual Shakeout, 8' x 10', with two 20 HP Motors.

1—Shakeout Belt Conveyor, 24" x 20', with magnetic pulley, motor & drive.

2—INTERNATIONAL Type G Molding Machines Size 24 x 10.

1—JOHNSON & JENNINGS #918 Jolt Rollover Pattern Draw, 44" x 54" table, 20" draw, 2000 lb. jolt cap.

1—SIMPSON No. 1 Style UD Sand Muller, New 1947.

1—HOUGH Model HA Payloader, 12 cu. ft. bucket cap., New 1955, with torque converter drive.

1—HOUGH Model HA Payloader, 12 cu. ft. hydraulic tilt bucket, New 1947, standard transmission.

1—BEARDSLEY & PIPER #3½ Mulbaro.

2—KANE & ROACH Core Wire Straighteners Model DX-5, New 1950.

4—Modern FA-9 Pouring Devices, with taper covered ladles.

1—NATIONAL Sand Storage Hopper, 30-ton cap., with hopper gates, used 3 mos.

2—GEHNRICH Core Ovens, 18' wide, 24' deep, 9' high, oil fired, recirculating, with recording controls and cars. New 1941.

1—CANTON Alligator Shear, Size 1½.

1—INGERSOLL RAND Centrifugal Pump Size 4, Model HMT-4, with 100 HP Motor, New 1943.

1—INGERSOLL RAND Centrifugal Pump, #3-EV with 100 HP Motor. New 1943.

1—INGERSOLL RAND 4RT—4 Stage Single Suction Centrifugal Pump, with 200 HP Motor. New 1951.

1—Complete Laboratory, including Fisher Titrimeter, Lab Balance Scales, Precision Scientific Lab Oven, Simpson Lab Muller, Dietert Heating Oven, Dietert Sand Strength Machine, Dietert Sand Rammer, Dietert Permeability Meter, Dietert Moisture Tester, Dietert Sand Sifter.

LITCHFIELD, ILLINOIS

ONE OVERHEAD SAND SYSTEM, consisting of:

2—SIMPSON #3 Sand Mullers, S/N 44-018.

1—JEFFREY Sand Storage Hopper, 16' long, 8' wide, 13' high.

2—JEFFREY Apron Conveyors, under each Hopper section, 48" wide, 12' long.

2—Motors and Exhausters for Mullers.

1—JEFFREY Sand Distribution Belt, 30" wide by 130' long.

1—JEFFREY Bucket Elevator, 50' high, 10" belt, with 7" x 5" buckets.

6—CARL MAYER Batch Type 2-Compartment Core Ovens, gas fired, recirculating I.D. 7' wide, 14' deep, 8' high, with Leeds & Northrup controls, swing out doors. LIKE NEW.

3—U. S. ELECTRICAL Model 64 Double End Snag Grinders, 7½ HP Motor, 4-speed, 20" x 3" wheel.

2—OSBORN #276-J Portable Jolt Squeezers.

4—INGERSOLL RAND Size B Air Hoists, 1000 lb. capacity.

3—INGERSOLL RAND Size C Air Hoists, 2000 lb. cap.

3—INGERSOLL RAND Size D Air Hoists, 4000 lb. capacity.

1—AMERICAN WHEELABRATOR 48" x 42" Tumblast, Model 450, with Loader, S/N 60726.

2—EC & M Crane Magnets, 45" and 48" diameters.

1—HERMAN 3000 lb. series Jolt Rollover Pattern Draw Machine, used 6 months LIKE NEW.

1—G.E. Model 0X140 Industrial X-Ray.

1—SLY 36" x 48" Tumbling Barrel Timken bearing, with Motor & Drive.

5—ROSS Bench Type Core Drawers.

1—TOCCO JR. Heat Treating Induction Unit, single station, w/20 KW 9600 cycle single phase Generator, and 40 HP Induction Motor.

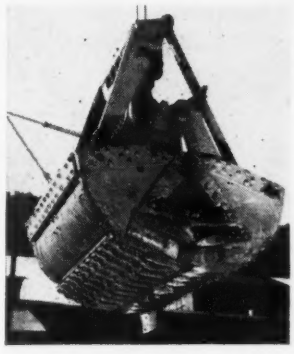
3000 Transite Core Plates—send us your requirements.

AAA MACHINERY & EQUIPMENT CO.

15539 SARANAC ROAD — CLEVELAND 10, OHIO — CALL LI. 1-6545

• HANDLE COKE WITH MINIMUM DEGRADATION • HANDLE SAND WITHOUT LEAKAGE

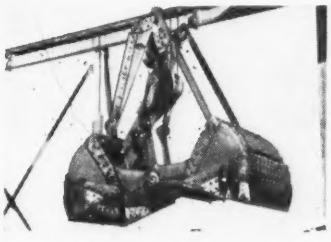
with the same BLAW-KNOX
DUAL-PURPOSE FOUNDRY BUCKET



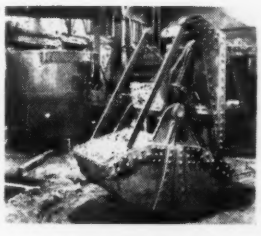
BLAW-KNOX "Shark Tooth" Single-Line Hook-On Buckets cut the cost of rehandling coke, coal, sand, and small limestone because one bucket, with easily attached or removable liner plates, is all you need. With the plates attached, fine granular materials are handled without leakage. Without the liner plates, the "shark teeth" literally finger their way through the coke, so it may be handled with minimum degradation. Hook-On feature permits quick detaching for change to magnet.

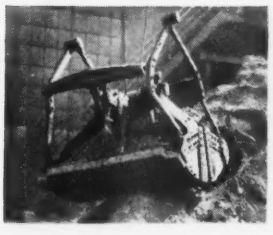
Above — Rated 1-cu. yd. closed head type Blaw-Knox "Shark-Tooth" Bucket, without liner plates, reeved 2-parts for 13'6" headroom. Range of sizes for every requirements.

Right — This open head type Blaw-Knox Bucket, rated 1-cu. yd., is equipped with liner plates for rehandling sand, coal, limestone, etc. Shown reeved 2-parts for 8'9" headroom. Choice of sizes.



BLAW-KNOX BUCKETS
help solve average or unusual conditions





FOR AVERAGE HEADROOM — There's a type and size of Blaw-Knox Single-Line Hook-On Foundry Buckets to meet a wide range of operating conditions. Take advantage of the Blaw-Knox engineering service available without obligation to help you select the bucket best suited to your needs.

FOR LOW HEADROOM — This Blaw-Knox Single-Line Hook-On Bucket solves rehandling problems when headroom is extremely limited. The ¾-yd. capacity bucket requires only 6'7" operating headroom. Also available in larger sizes.

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PITTSBURGH 38, PA.

Offices in Principal Cities

BLAW-KNOX FOUNDRY BUCKETS

BLAW-KNOX

THE MOST COMPLETE RANGE OF SIZES AND TYPES

Circle 772 on Inquiry Card—Page 219

new... DRILL PRESS *flexibility*
FASTER-EASIER PATTERN WORK

SHOPMASTER
Heavy-duty safety chuck
Key-type safety switch
Positive Stops at Normal Drilling Position
Précision-ground table, adjustable through 360°
24" Radial Arm DRILL PRESS DP-24A
Extra-heavy cast-iron base provides sturdy mounting, smooth operation.

Radial arm adjusts for positive angle drilling.

Swings to desired angle by simple adjustment of radial arm.

Extra-large drilling capacity accommodates hard-to-handle objects.

LOW COST SHORT-CUT TO INCREASED PRODUCTION

The first *economically-priced* drill press with *radial arm* . . . the answer to a long-felt need in shops everywhere. Shopmaster DP-24A adjusts instantly to any angle, accommodates large, hard-to-handle work . . . eliminates costly, time-consuming "make-ready" operations. And, remember, Shopmaster gives you the benefit of Jones & Lamson's century of experience in manufacturing industrial machine tools . . . gives you "heavy-duty" engineering, scaled to fit the needs of light industry.

WRITE TODAY FOR COMPLETE DETAILS

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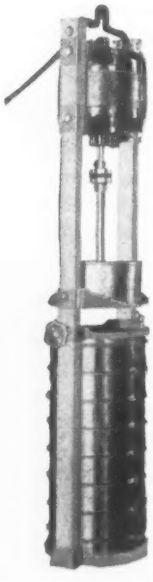
Circle 773 on Inquiry Card—Page 219

SCREEN TWICE AS MUCH FOR HALF YOUR PRESENT COST !

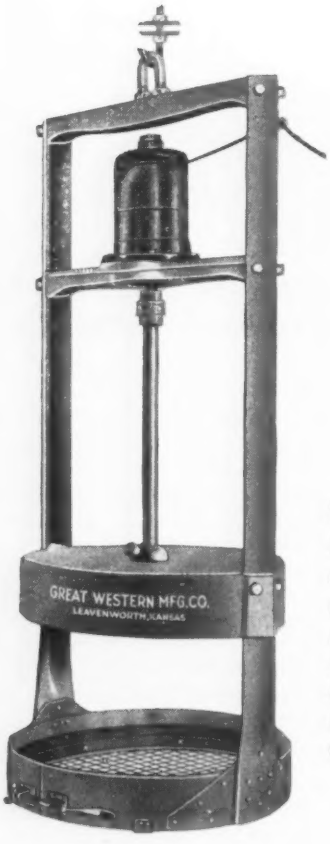
TYPE "V"

Screens sand Fine, Coarse, Medium, 20″ dia. sieve with special clamp for 5-second changes. Does work of 10 men. Fully-enclosed 1/6 h.p. motor. 4′ 6″ high, weight 100 lbs. 20″ Sieve: $275.00. Giant V-5, 36″ Sieve: $495.00.



TYPE "HL"

Laboratory model . . . specially designed for sand control. Fitted with 1/6 H.P. motor. Price, complete less sieves: $250.00.



TYPE "CR"

24″ dia. round sieve. Thoroughly sifts, mixes, fluffs, aerates the sand. ⅓ H.P. enclosed motor. Height 4′ 6″, weight 250 lbs. Complete: $350.00.

TYPE "CS"

24″ square sieve. Continuous operation, no dumping. Refuse tails off to one side. Height 4′ 10″, weight 295 lbs. With ⅓ h.p. enclosed motor. Complete: $360.00.

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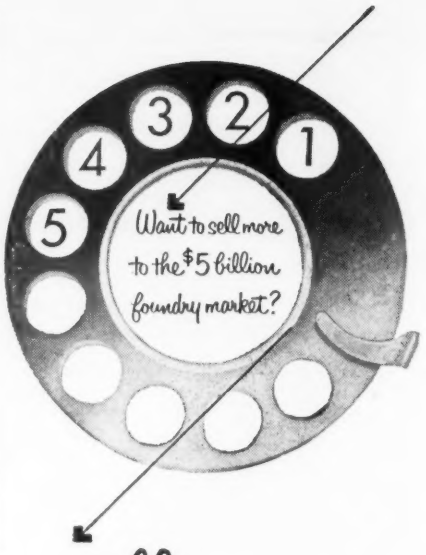
GREAT WESTERN MFG. CO.

Leavenworth • Kansas



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to put extra push behind your sales program

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Penton Building, Cleveland 13, Ohio

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BULLARD

We wish to take this opportunity to express our sincere appreciation to our many friends in the foundry industry for their guidance, counsel and cooperation in planning, installing and erecting their equipment which makes our new Foundry the finest — most modern — most complete jobbing grey iron foundry on the Atlantic Seaboard.

THE BULLARD COMPANY

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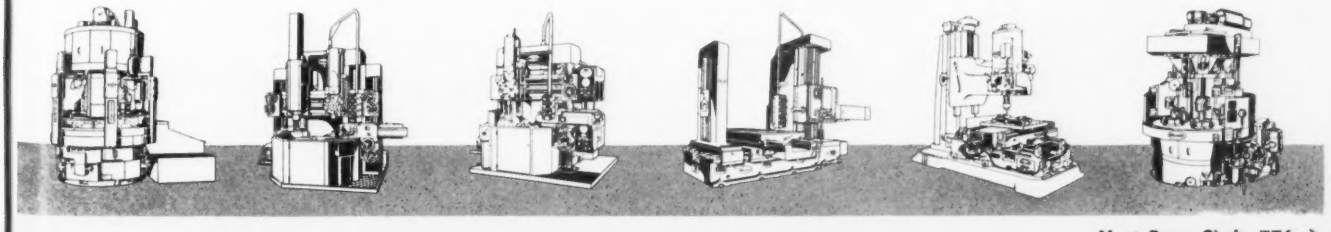
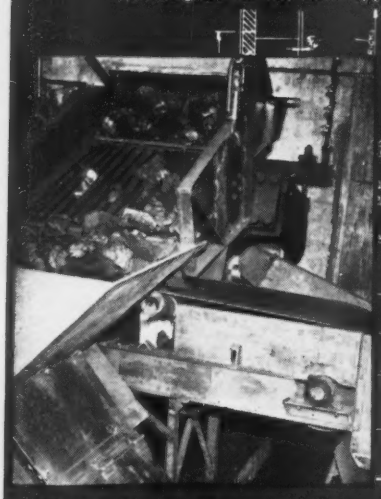
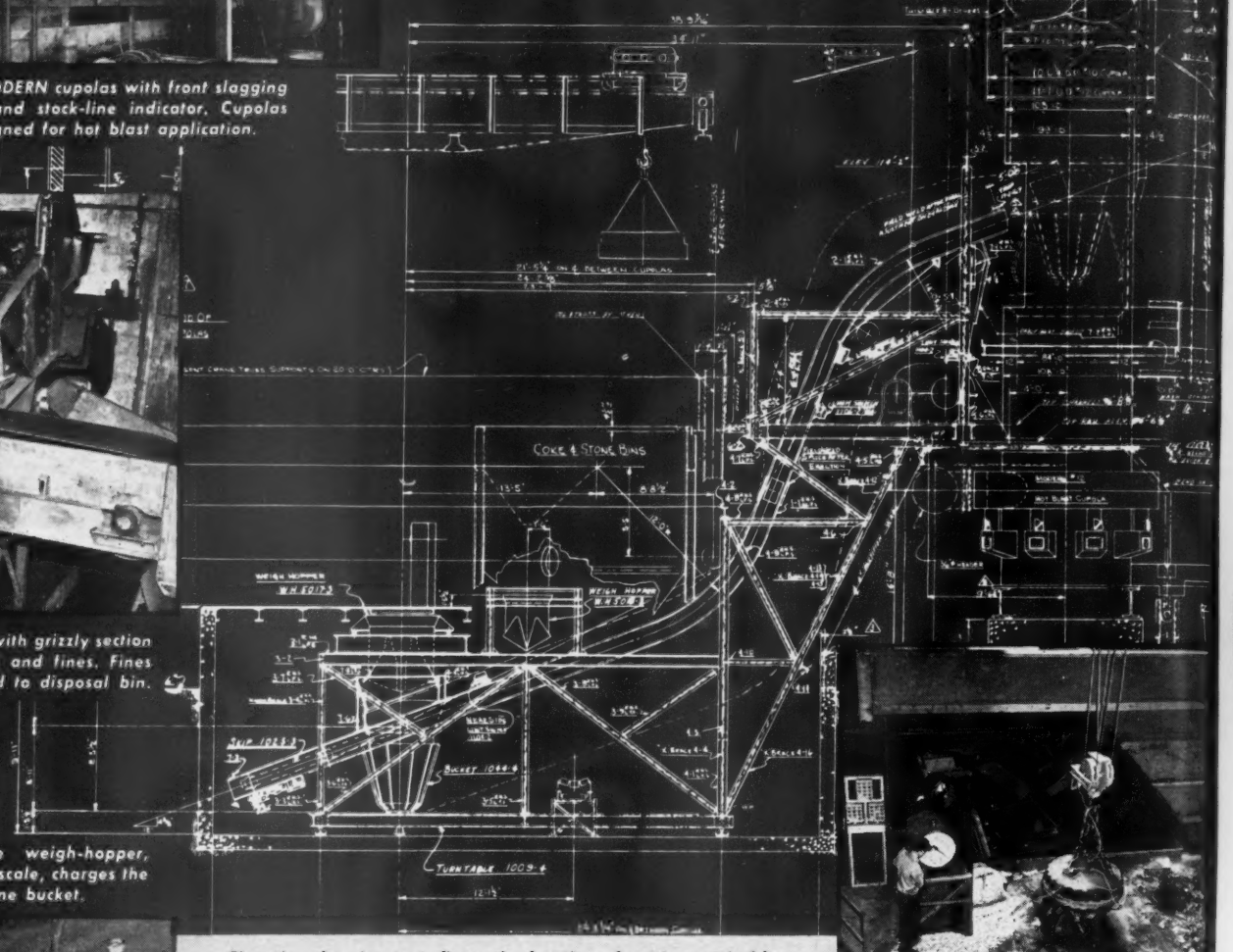


MODERNIZE

Four, MODERN cupolas with front slagging system and stock-line indicator. Cupolas are designed for hot blast application.

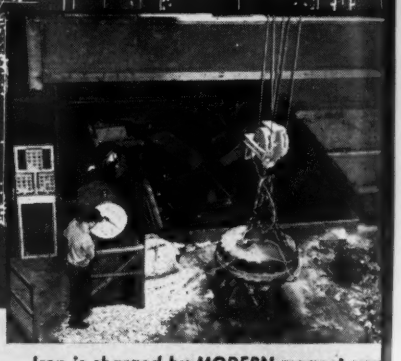


Vibratory feeder with grizzly section eliminates breeze and fines. Fines are belt conveyed to disposal bin.

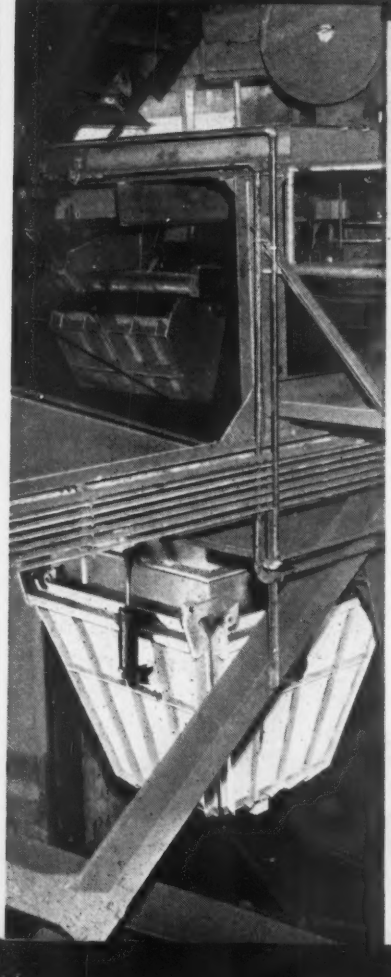


Coke and stone weigh-hopper, mounted into the scale, charges the MODERN small-cone bucket.

Elevation drawing to indicate the location of equipment inside the foundry and relation of charger to the yard crane.



Iron is charged by MODERN magnet crane



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From start-to-finish this 100%, MODERN installation is helping to control automobile costs for one of America's foremost builders. Here under one roof the new, MODERN-ENGINEERED charging and melting system is producing the gray iron for less and faster, too:

- All charging operations are controlled by two men . . .
- Conveying the coke and stone from bins to coke and stone weigh-hopper, weighing and recording are done automatically . . .
- MODERN stock-line indicator maintains the charge-level at its maximun melting efficiency . . .
- Swivel charger serves two cupolas at one charger-cost . . .
- MODERN-HYDRO-WASH — flushing away of ash and slag from stac and spouts to the settling tanks — reduces disposal costs . . .

In every way it pays to ask about the single responsibilit which MODERN has proved to be more profitable and mo satisfactory for all foundries both large and small . . .

MODERN

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Department F-10 Port Washington, Wisconsin

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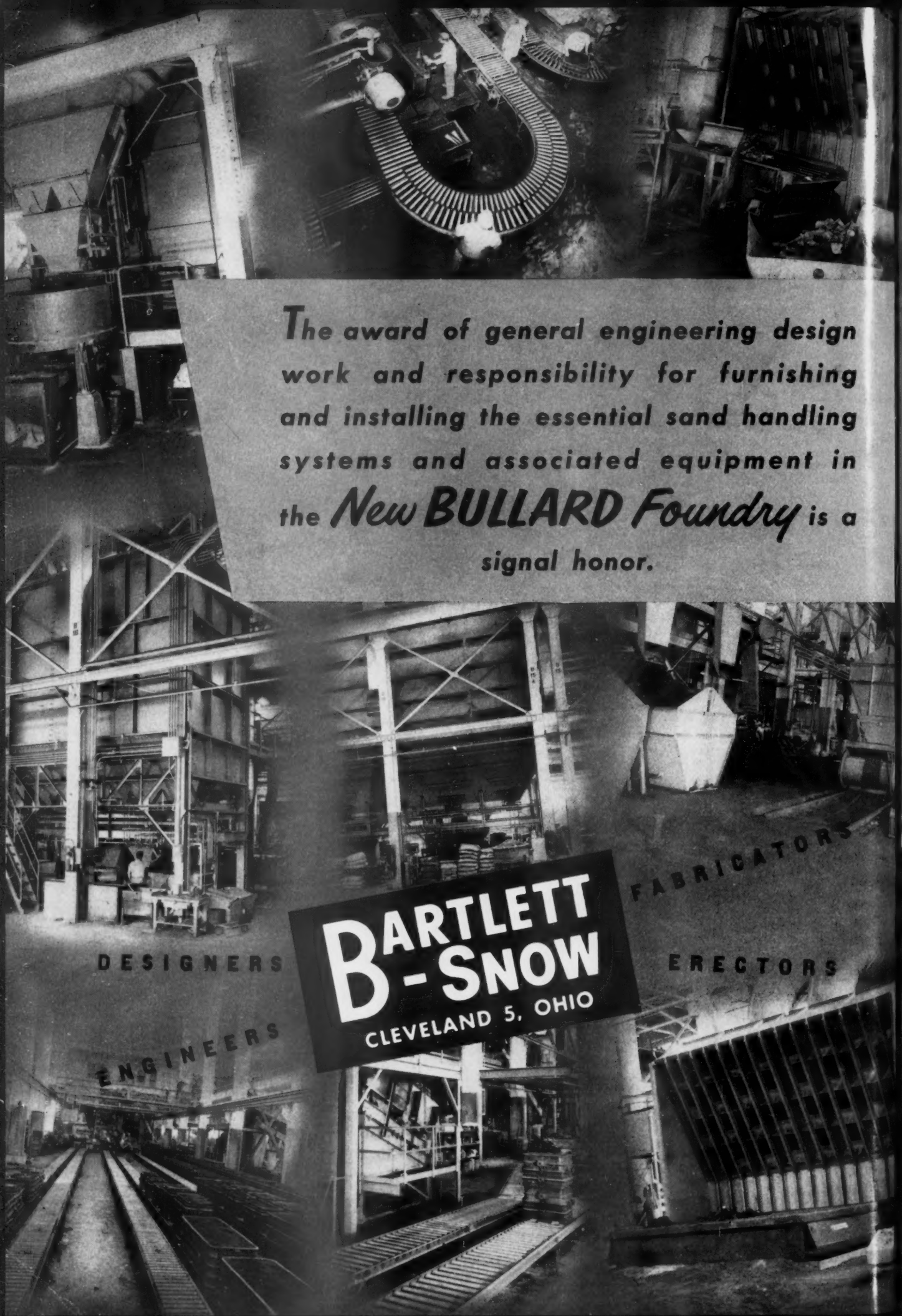
The award of general engineering design work and responsibility for furnishing and installing the essential sand handling systems and associated equipment in the New BULLARD Foundry is a signal honor.
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